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MAY 24 1999

**RCRA FACILITY INVESTIGATION
PHASE I WORK PLAN
EPA IDENTIFICATION No. KSD007246846
SAFETY-KLEEN (WICHITA) FACILITY
2549 NORTH NEW YORK AVENUE
WICHITA, KANSAS**



**ENVIRONMENTAL
DECISION GROUP, INC.**

Innovative Services • Advanced Technology

**5665 Flatiron Parkway
Boulder, Colorado 80301**



R00146622

RCRA RECORDS CENTER

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A Safety-Kleen Company



May 22, 2001



MAY 22 2001

Mr. William F. Lowe
RCRA Corrective Action & Permits Branch
Air, RCRA and Toxics Division
U.S. Environmental Protection Agency
Region VII
901 North 5th Street
Kansas City, KS 66101

Re: Response to Comments
Safety-Kleen (Wichita), Inc. Facility
2549 North New York Avenue
Wichita, KS 67219
EPA Identification No. KSD007246846

Dear Mr. Lowe:

This letter responds to comments presented in your letter dated March 6, 2001, regarding the review of the Quality Assurance Project Plan (QAPP) included in the RFI Phase I Work Plan for the Safety-Kleen (Wichita), Inc. (SKW) facility located in Wichita, Kansas. The subject document was dated October 14, 1999 and outlined a scope of work that focused on initial soil and groundwater sampling to identify potential releases from select Phase I solid waste management units (SWMUs) and areas of concern at the SKW facility. Safety-Kleen Consulting (SKC) has prepared this correspondence on the behalf of SKW.

The italicized text below presents the EPA's comments and our responses follow. If these proposed changes meet with your approval, then we recommend that this letter and the associated tables and attachments act as an amendment to the Work Plan and modify the QAPP accordingly.

General

Response: Since EPA and KDHE have previously approved the RFI Work Plan for the S-K Wichita facility (which includes a quality assurance presentation in Section 7.0), your comments are viewed as suggestions to improve the existing RFI Work Plan. Furthermore, the procedures followed in the RFI work conducted to date meets the requirements of our approved work plan and the improvements stated herein. The proposed changes made are primarily to correct oversights not previously noted by the agencies or SKC, and/or the addition of details to clarify certain items. SKC has addressed the suggested changes on a point-by-point basis below. Also attached to address the comments on the QAPP are the following items:



- A distribution list;
- A signature page;
- A revised analytical methods table (Table 5);
- A new groundwater protection pathway table with risk-based standards (Table 6);
- A list of personnel and the project roles (Table 7);
- Two new SOPs requested (for use of the OVM and soil sampling);
- A Table of Contents for Appendix G; and,
- An QAPP for the laboratory equipment/procedures.

These comments and attachments should replace and append the existing Work Plan text, as appropriate. The Work Plan figures did not require revisions.

1. *Table 5: Soil samples according to the SW-846 Methods, Chapter 3, Methods 6000-7000 do not require acidification as a preservation. However, water samples for manganese do require acidification. The reason for acidifying the soil samples but not the water samples should be clarified.*

Response: The reference to acid preservation of soils in Table 5 is incorrect. The table should state that soil samples are to be chilled upon collection to 4 degrees Celsius. Water samples for manganese analysis should be acidified. Dissolved manganese samples should be field filtered prior to acidification. These discrepancies, and some others not noted (i.e., holding time for hexavalent chromium and mercury) have been corrected in an updated Table 5 (attached).

2. *Section 1, page 2 (R5-B9): This section references historical data. The QAPP should explain how this data would be used for decisions within the RFI. The historical data in Appendix E do not appear to have sufficient information to evaluate the quality of the results for the project. Specifically:*

1. *Were the methods used for the analyses during the 1986-1990 period the same as the analyses during the 1994-1997 period?*
2. *What were the method detection limits (MDLs) for each analysis?*
3. *What were the surrogate recoveries for the monitoring wells, and the data collected prior to 1994?*
4. *What were the acceptance criteria for the data presented in the appendix?*
5. *Why were analyte data not consistently collected for each location?*

6. *Will the data be comparable to the current activities? If not, then what is the impact upon the project?*

Response: The data presented in Appendix E were collected as part of the CERCLA RI/FS investigation for the North Industrial Corridor (NIC) site. These data were collected by others under work plans approved by the KDHE and placed in a database by Camp Dresser McKee. We therefore consider that the methods used were those required to produce the highest possible quality data in accordance with CERCLA requirements. These data were provided in the appendices of our RFI Work Plan for the following reasons: 1) To provide a "big picture" overview of some of the NIC data issues; 2) Because they were the only significant data available on or near our site at the time the Work Plan was written; and 3) To assess general groundwater quality trends in the site vicinity. Therefore, we do not believe it is necessary to perform additional validation of these historical data.

3. *Section 3.5.3, page 11: In the second paragraph the plan describes water levels being less than 10 feet, while in the fourth paragraph Safety-Kleen predicts water levels from 12-14 feet. This discrepancy should be corrected.*

Response: The referenced depth to water of 10 feet is from a PRC document and includes water level measurements obtained from the SKW facility and surrounding properties. The depth to water value of 12-14 feet is specific to the SKW facility, and is based on actual monitoring well depth to water measurements by SKC. Differences in topography across the site and vicinity account for variances in the depth to water measurement.

4. *Section 6.2, page 30: This section states "...soil impacts will be compared to levels that are protective of groundwater based on USEPA and/or KDHE guidelines." Provide a table which has the soil to groundwater screening limits. Make sure that the analytical MDLs are below the groundwater protection limits.*

Response: See Table 6 (attached) which provides method detection limits, KDHE groundwater protection standards, and Region IX Preliminary Remedial Goals (PRGs). A comparison of the analytical MDLs to these protective standards indicates that they are below the applicable groundwater protection standards.

5. *Section 6.3, page 30: The second bullet discussed coding outlier data. Table 4 lists the samples, most of which are biased. Define a "statistical outlier" with biased data. EPA QA/G-9, the guidance on data quality assessment indicates that elimination of outliers from biased data severely skews the results.*

Response: The discussion of outlier results is not particularly appropriate for the sampling program targeted to identify source areas (biased sampling). SKC has no intention of eliminating representative analytical data obtained during this investigation based solely on the use of a targeted sampling approach.

6. *Section 7.1.7, page 36: This section describes only one field instrument, the PID for VOC determination. There is no SOP for this instrument. Additionally, other field tests are planned which are not described in this section, such as meters for temperature, pH, conductivity, and dissolved oxygen. Add a SOP for PID screening as well as discussion of the other field-testing methods.*

Response: SKC field team members operate each of the field instruments noted above according to instrument manufacturers specifications. If periodic calibration of the field instruments are required, a record of the associated calibration procedure is noted in bound project-specific field logbooks. Several detailed SOPs for field instrument procedures are included in Appendix G (Standard Operating Procedures) of the Work Plan. These SOPs typically cover specific field techniques which utilize various instruments (i.e., the use of the OVM/PID to monitor headspace VOCs), not basic instrument operation. An SOP (attached) should be added to Appendix G to detail operation and calibration of the organic vapor monitor (OVM) instrument.

Also provided is a table of contents for the SOPs in Appendix G, including those attached to this letter.

7. *Section 7.1.8, page 37: This section states that "duplicate samples are primarily for inorganic analysis." This statement appears to be inconsistent with guidance documents. Duplicate samples are for all analyses when determining the problem for precision is matrix related. Explain/justify this apparent discrepancy.*

Response: The text should have stated that field duplicates are collected to assess matrix homogeneity, and also reflect combined precision of field sample collection methods and laboratory analytical methods. The reference to inorganic analyses was incorrect. Duplicate groundwater samples collected at the site have been tested for the full suite of analytes.

8. *Section 7.2.1, page 38: There is a good description of the types of QC samples for the analytical methods. However, the plan should include the frequency at which these QC samples will be analyzed.*

Response: The last sentence under the description of surrogate recoveries states that laboratory QC samples will be analyzed at the frequency stipulated by the SW-

846 methods. The laboratory QC analyses discussed in Section 7.2.1 are all to be analyzed on a batch specific frequency, with the exception of surrogates, which are analyzed with every organic sample (organic analyses involving gas chromatography).

9. *Appendix G: This section appears to be missing SOPs for the collection of soil samples from the borehole locations and there is no SOP for the field PID.*

Response: As previously noted, a new SOP for operation of the OVM will be added to Appendix G. Soil sample collection is described in the attached SOP.

10. *Section 1 (R5-A1, QAMS-1.0): There is no signature of the project manager, and there is no indication that a quality assurance officer/manager exists. Signatures show acceptance of the document by all participants. If there are any legal requirements relative to EPA, EPA should also have signatures for the EPA Project Manager and the Regional Quality Assurance Manager.*

Response: A signature page has been created and is enclosed for the RFI Phase I Work Plan. SKC has identified a Quality Assurance (QA) officer (Mr. Kenneth Vogler, P.E.) for the project. The QA officer will be added to the signature page.

11. *Section 4 (R5-A4, QAMS-3.0): Key individuals are identified. However, no distribution list exists for those people who would receive the document and subsequent updates. There is no quality assurance officer/manager; there is no evidence of an independent review of the data.*

Response: A distribution list page has been prepared and attached to this document. As previously noted, a QA officer has been identified (Mr. Kenneth Vogler, P.E.). SKC utilizes a procedure where an independent contractor (Mr. William Huskie, Geochemist), performs data validation as part of the current and future data evaluation process.

12. *Section 3 (R5-A6, QAMS-3.0): Applicable regulations are alluded to for the RCRA Facility Investigation, the USEPA Risk-based Levels, and the KDHE Risk-based levels. There are no details which allow the tracking of the specific portions of these regulations.*

Response: The regulatory framework for the RFI Work Plan is described in Section 1. KDHE and EPA Risk-based action levels are included in the new Table 6 (attached). The source and date of the risk-based action levels are identified on Table 6.

13. *Section 6 (R5-C1 and D2, QAMS-12.0): This section indicates that the data will be reviewed. It is not clear for what it will be reviewed against when no criteria nor action limits appear to have been established or documented in this plan.*

Response: Data will be initially reviewed against Federal MCLs and appropriate EPA and KDHE risk-based action levels provided in the attached Table 6. Criteria for selection of site-specific action levels have not been established at this early time in the investigation process. Additionally, data will be validated against EPA National Functional Guidelines for Review of Inorganic and Organic Analyses (current versions of these documents), as appropriate.

14. *Section 7 (R5-A7, QAMS-5.0): The measurement quality objectives are described. However, the details relative to frequency and criteria appear to be missing, as do the action levels.*

Response: As previously noted, the frequency for laboratory QC analyses is specified in the applicable EPA methods. Acceptance criteria for accuracy of laboratory control samples, surrogates, and matrix spikes are laboratory method derived, and are presented in the laboratory reports. Acceptance criteria for precision of MS/MSD recoveries, LCS/LCSD recoveries, and laboratory duplicates are similarly derived. Acceptance criteria for combined laboratory and field duplicate precision is set at 50% relative percent difference (RPD) for validation purposes.

15. *Section 7 (R5-B6, B7, B8; QAMS-8.0, 13.0): The only location where instrument testing, inspection, and calibration are discussed are in the SOPs located in Appendix G. There is no discussion of these activities for the field PID instrument, nor for the analytical instruments.*

Response: As previously noted, Appendix G will be revised to include an SOP for the PID operation and calibration. An SOP and quality assurance plan (QAP) for operation of applicable laboratory analytical equipment from Severn Trent Laboratory is enclosed.

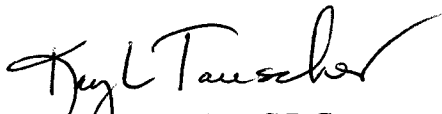
Mr. William F. Lowe
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16. *General: The only reference to responsible individuals is in Section 4.1 under the discussion of project personnel. It appears the project manager is responsible for everything, including well drilling, sample collection, and sample analysis. The project manager may be ultimately responsible for the final results; however, they may not be able to recommend corrective actions for specific activities, i.e., the VOC analysis or improper procedures for the drill. Additional personnel (by titles) should be described along with their responsibilities.*

Response: The attached Table 7 provides the specific personnel who will fill the roles of field operations manager, quality assurance officer, risk assessment manager, health and safety officer, and data validation reviewer.

If you have questions or comments on this amendment to the RFI Work Plan, please contact Ms. Tauscher at (303) 938-5535.

Sincerely,


Kay L. Tauscher, C.P.G.
Project Manager/Hydrogeologist


Brian Martinek, P.G.
Senior Project Manager/Hydrogeologist

Attachments


Cc: Ms. Christine R. Jump, KDHE
Mr. Geoff Jones, S-K, Columbia, SC
Mr. John Arbuthnot, S-K, Baton Rouge, LA
Mr. Ron Robertson, S-K, Wichita, KS

**RCRA Facility Investigation (RFI)
Safety-Kleen (Wichita), Inc.
Wichita, Kansas**

May 22, 2001

Safety-Kleen Consulting, Inc. (SKC) is submitting this RFI Work Plan to the U.S. Environmental Protection Agency (EPA) on behalf of Safety-Kleen (Wichita), Inc. This RFI Work Plan has been prepared in accordance with the RFI Guidance Documents and SKC's quality control/quality assurance procedures to ensure that the work plan meets industry standards in terms of methods used and the information presented. Questions or comments on this document should be directed to one of the individuals below at phone (303) 938-5500.

Respectfully Submitted,
SAFETY-KLEEN CONSULTING, INC.


Kay L. Tauscher, CPG
Hydrogeologist/Project Manager

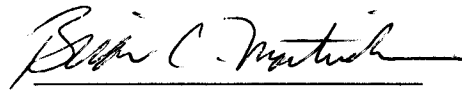

Brian Martinek
Hydrogeologist /Senior Project Manager

Table 5
Analytical Methods
Safety-Kleen (Wichita), Inc. Facility

Parameter	Anticipated Method	Matrix	Preferred Container (#) Type	Minimum Amount Required	Preservation & Storage	Holding Time
Volatile Organic Compounds (VOCs)	8260B	Water	(2) 40 ml VOA Glass	40 ml	pH<2 w/HCl,4°C	14 Days
Volatile Organic Compounds (VOCs)	8260B	Soil	(1) 125 ml SJ	10 g	pH<2 w/HCl,4°C	14 Days
Methane	RSK175 Mod.	Water	(2) 40 ml VOA Glass	40 ml	pH<2 w/HCl,4°C	14 Days
Chloride	325.2	Water	(1) 250 ml HDPE	5 ml	none	28 Days
Sulfate	375.4	Water	(1) 250 ml HDPE	100 ml	4°C	28 Days
Alkalinity, Carbonate & Bicarbonate	310.1	Water	(1) 250 ml HDPE	50 ml	4°C	14 Days
Calcium (Total)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
Magnesium (Total)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
Potassium (Total)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
pH - Corrosivity	9040B	Soil	Glass vessel	---	None	None specified
Manganese (Total)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
Manganese (Dissolved)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
RCRA Metals	6010	Soil	Glass	8 oz	4°C	6 Months
Iron (Total)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
Iron (Dissolved)	6010	Water	(1) 1L HDPE	200 ml	pH<2w/HNO3	6 Months
TPH	8015 Modified	Soil	---	200 g	4°C	None specified
Semivolatiles (SVOCs) - GC/MS	8270C	Soil	Amber Glass vessel	30 g	4°C	14 Days (ext.)/
pH - Corrosivity	9040B	Soil	Glass vessel	---	None	None specified
Pesticides	8081A	Soil	(1) 250 ml SJ	30 g	4°C	14 Days
SVOC - PNA	8270C	Soil	(1) 250 ml SJ	30 g	4°C	14 Days
Nitrogen, Nitrate and Nitrate	353.2	Water	(1) 250 ml HDPE	10 ml	pH<2 w/H ₂ SO ₄ ,4°C	28 Days
Nitrogen, Ammonia	350.1	Water	(1) 250 ml HDPE	5 ml	pH<2 w/H ₂ SO ₄ ,4°C	28 Days
Total Organic Carbon (TOC)	415.1	Water	Glass vessel	200 ml	pH<2 w/H ₂ SO ₄ ,4°C	28 Days
Total Dissolved Solids (TDS)	160.1	Water	(1) 250 ml HDPE	100 ml	4°C	7 Days

* Where reference to the most currently promulgated SW-846 methods is made, previous versions may also be inferred.

Table 6
Analytical Methods, Detection Limits and Screening Criteria
Safety-Kleen (Wichita), Inc. Facility

Parameters	Units	Method Detection Limit	Test Method	Region IX PRGs ¹ (Non-Residential)	KDHE Tier ² Non-Residential Soil to GW
Percent Moisture	%	0.5	D 2216-90	N/A	
Corrosivity	No Units	1	9040B	N/A	
RCRA Metals					
Arsenic	mg/kg	30	6010B	2.7(ca) - 440(nc)	29
Barium	mg/kg	20	6010B	>100000	NA
Cadmium	mg/kg	0.5	6010B	810 nc	NA
Chromium	mg/kg	1	6010B	64 - >100000 (VI - III)	NA
Lead	mg/kg	10	6010B	750 nc	NA
Mercury	mg/kg	0.1	7471A	610 nc	NA
Selenium	mg/kg	25	6010B	10000 nc	NA
Silver	mg/kg	1	6010B	10000 nc	NA
Organic Constituents					
VOCs					
1,1,1-Trichloroethane	ug/kg	5	8260B	1400000 sat	5.50E+00
1,1-Dichloroethane	ug/kg	5	8260B	2100000 nc	1.30E+04
1,1-Dichloroethene	ug/kg	5	8260B	120 ca	1.20E+02
1,2,4-Trimethylbenzene	ug/kg	5	8260B	170000 nc	2.50E+04
1,2-Dichlorobenzene	ug/kg	5	8260B	370000 sat	7.70E+04
1,3,5-Trimethylbenzene	ug/kg	5	8260B	70000 nc	NA
Chlorobenzene	ug/kg	5	8260B	540000 nc	4.80E+03
cis-1,2-Dichloroethene	ug/kg	2.5	8260B	150000 nc	8.00E+02
Ethylbenzene	ug/kg	25	8260B	230000 sat	5.50E+04
Isopropylbenzene	ug/kg	1000	8260B	520000 nc	NA
Methylene chloride	ug/kg	5	8260B	21000 ca	3.00E+01
m-Xylene & p-Xylene	ug/kg	5	8260B	210000 sat	7.00E+05
n-Butylbenzene	ug/kg	5	8260B	240000 sat	NA
n-Propylbenzene	ug/kg	5	8260B	240000 sat	NA
o-Xylene	ug/kg	2.5	8260B	210000 sat	7.00E+05
p-Isopropyltoluene	ug/kg	5	8260B	520000 nc	NA
sec-Butylbenzene	ug/kg	5	8260B	220000 sat	NA
Tetrachloroethene	ug/kg	5	8260B	19000 ca	1.80E+02
Toluene	ug/kg	25	8260B	520000 sat	4.00E+04
trans-1,2-Dichloroethene	ug/kg	2.5	8260B	210000 nc	1.50E+03
Trichloroethene	ug/kg	5	8260B	6100 ca	2.00E+02
Vinyl Chloride	ug/kg	10	8260B	830 ca	2.00E+01
Napthalene	ug/kg	5	8260B	190000 nc	1.40E+05
SVOCs					
bis(2-Ethylhexyl) phthalate	ug/kg	330	8270C	180000 ca	5.10E+07
Dimethyl phthalate	ug/kg	3300	8270C	>100000	NA
Pesticides					
4,4'-DDE	ug/kg	17	8081A	12000 ca	2.20E+06
Diesel					
Diesel Range Organics	ug/kg	1700	8015B	NA	1.00E+05

Notes:

NA=not available

¹ Source: USEPA Region IX Preliminary Remediation Goals (PRGs), USEPA Region 9 Website.

² Source: KDHE Risk-Based Standards for Kansas (RSK Manual), March 24, 1999

TABLE 7

Personnel Roles

Phil Cavendor.....	Field Operations Manager
Kenneth Vogler	Quality Assurance
Susan Flack	Risk Assessment Manager
Ram Ramaswami	Health and Safety Officer
William Huskie	Data Validation Reviewer



Shallow Surface Soil Sampling

Safety-Kleen Consulting SOP Number - 2(A)

Revision Number - 2

Date - February 22, 2001

THEORY

This Standard Operating Procedure (SOP) describes methods for sampling surface and near surface soils. The hand tools needed for the job include trowels, hand augers, thin walled tube samplers, triers, and split spoons. These sampling tools should be selected based on soil types and contaminant of interest; each match between a tool and soil type/contaminant should yield samples sufficiently representative that environmental data can be drawn from the sample. Representative samples are critical, because the resulting environmental data should be both unbiased (i.e. accurate) and precise.

SUMMARY

The degree of allowable disturbance in a soil sample is determined by the contaminant of interest, and the soil type. The hand tools listed in this SOP are designed to be drilled or pressed into soils or soil-like materials, and then withdrawn with the sample held in the tool.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ sampling plan
- ___ maps
- ___ field logbooks
- ___ data forms
- ___ PPE dictated by site health and safety plan
- ___ brunton and tape measure, if necessary
- ___ survey stakes or flags
- ___ camera and film, if necessary
- ___ stainless steel hand auger
- ___ homogenization buckets or bowls, if necessary
- ___ sample containers
- ___ resealable plastic bags, if necessary
- ___ sample labels
- ___ sample chain of custody seals, if necessary
- ___ chain of custody forms
- ___ cooler(s) or carry - boxes
- ___ wet ice or blue ice, if necessary
- ___ decontamination supplies (see Safety-Kleen SOP 9 and 10)
- ___ drop cloths, plastic sheeting, or Visqueen (or equivalent)
- ___ paper towels
- ___ plastic or stainless steel spoons
- ___ indelible ink pen
- ___ sampling tool, selected from table (below)
- ___ wrench, pliers to fit sampling tool

Possible Sampling Tools



Shallow Surface Soil Sampling

Safety-Kleen Consulting SOP Number - 2(A)

Revision Number - 2

Date - February 22, 2001

Sampling tool	Matrix	Contaminants of concern
trowels	most soils	metals, volatiles, and semivolatiles
triers	gravel poor soils, silts, loams	metals, volatiles, and semivolatiles
split spoons*	most soils, gravel < spoon inner diameter	metals, volatiles, and semivolatiles
thin - walled tubes*	gravel poor, clay rich soils, silts, loams	metals, volatiles, and semivolatiles
hand augers**	clay poor soils, gravel < spoon inner diameter	metals and semivolatiles

* Some regulatory agencies require brass inner liners for tube or spoon samples.

** Hand augers are not preferred for low concentration volatile organic analyses because the tool could outgas ultratrace levels of volatile organics.

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Decontaminate gear (see Safety-Kleen SOP 9 or 10).
4. Assemble sampling tools, if necessary.
5. Mark all sampling locations according to the sampling plan.
6. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling point.
7. Place sampling gear on the sheeting.
8. Remove excess surficial material, such as vegetation, trash, or rocks, if necessary.
9. Plunge and rotate the tool into the soil or monofill formation.
10. Extract the tool.
11. Place the collected soil either in the sampling bowl or directly into the container.



Shallow Surface Soil Sampling

Safety-Kleen Consulting SOP Number - 2(A)
Revision Number - 2
Date - February 22, 2001

12. Homogenize the sample in the sampling bowl, if specified in the sampling plan. **Do not homogenize for ultra-trace level volatile organics analysis.**
13. Make sure that the sampling container contains as much soil material as practical.
14. Attach a label to each sample container. Refer to Safety-Kleen SOP 1 for labeling requirements.
15. Attach the container security seal, if instructed in the sampling plan.
16. Complete the chain of custody form, indicating what analyses are necessary for each sample. See Safety-Kleen SOP 1A and 1B for chain of custody requirements.
17. Complete the field logbooks and the field forms, as required in the sampling plan.
18. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to Safety-Kleen SOP 1 for DOT and Federal Express requirements.
19. Remove all sampling refuse from the sampling site.

REFERENCES

- USEPA, 1984, Characterization of Hazardous Waste Sites, A Methods Manual - Volume II, Available Sampling Methods, 2nd Edition, EPA-600/4/84-076
- USEPA, 1987, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001
- USEPA, 1991, Compendium of ERT Soil Sampling and Surface Geophysics Procedures, Interim Final, OSWER Directive 9360.4-02
- ASTM D 1586 - 84, Standard Method for Penetration Test and Split Barrel Sampling of Soils
- ASTM D 1587 - 83, Standard Practice for Thin - Walled Tube Sampling of Soils
- ASTM D 1452 - 80, Standard Practice for Soil Investigation and Sampling by Auger Borings



Soil Sampling From A Drilling Rig

Safety-Kleen Consulting SOP Number - 2(B)

Revision Number - 2

Date - February 22, 2001

THEORY

This Standard Operating Procedure (SOP) describes methods for sampling soils and monofill materials from depths unreachable with hand tools. The tools needed for the job include hand-operated power augers, small truck-mounted drill rigs, or a large mobile drilling rig. Once a boring has been advanced to the desired sampling depth, a variety of sample tubes can be used to retrieve representative samples. The combination of power tool and sampling device is determined by the contaminant of interest, and the soil type; each match between a tool and soil type/contaminant should yield samples sufficiently representative that permit environmental data to be interpreted from the sample. Representative samples are critical, because the resulting environmental data should be both unbiased (i.e. accurate) and precise.

SUMMARY

The degree of allowable disturbance in soil samples is determined by the contaminant of interest, and the soil type. The drilling equipment and sampling tools listed in this SOP are designed to develop a boring to the horizon depth of interest, then retrieve a sample sufficiently representative of subsurface conditions.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ sampling plan
- ___ maps
- ___ field logbooks
- ___ data forms
- ___ PPE dictated by site health and safety plan
- ___ brunton and tape measure, if necessary
- ___ survey stakes or flags
- ___ camera and film, if necessary
- ___ homogenization buckets or bowls, if necessary
- ___ sample containers
- ___ resealable plastic bags, if necessary
- ___ sample labels
- ___ sample chain of custody seals, if necessary
- ___ chain of custody forms
- ___ cooler(s) or carry - boxes
- ___ wet ice or blue ice, if necessary
- ___ decontamination supplies (see Safety-Kleen SOP 9 and 10)
- ___ drop cloths, plastic sheeting, or Visqueen (or equivalent)
- ___ paper towels
- ___ plastic or stainless steel spoons
- ___ indelible ink pens
- ___ sampling tool, selected from table (see below)
- ___ wrenches, pliers to fit sampling tool
- ___ extension rods needed to reach the desired sampling horizon



Soil Sampling From A Drilling Rig

Safety-Kleen Consulting SOP Number - 2(B)

Revision Number - 2

Date - February 22, 2001

Power and Sampling Tools

Power rigs*	Matrix	Contaminants of concern
gas powered, hand operated posthole digger	most soils	metals, volatiles, and semivolatiles
hollow stem auger	most soils, gravel < 2/3 auger diameter	metals, volatiles, and semivolatiles
percussion / air cyclone rigs**	gravel rich soils, poorly consolidated bedrock	metals, volatiles, and semivolatiles
Sampling tools	Matrix	Contaminants of Concern
split spoons	most soils, gravel < spoon inner diameter	metals, volatiles, and semivolatiles
thin walled tubes	gravel poor / clay rich soils, silts, loams	metals, volatiles, and semivolatiles

* Safety-Kleen has a subcontractor approval process to ensure that drill rig operators meet the minimum requirements for health and safety and insurance coverage. Safety-Kleen does not operate a hollow stem auger or percussion rig.

** The volatile organic analysis (VOA) data associated with samples obtained using air cyclone rigs are subject to interpretation.

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Decontaminate gear (see Safety-Kleen SOP 9 or 10).
4. Mark all sampling locations according to the sampling plan; **AFTER PERFORMING A UTILITY CHECK.**
5. **PAY ATTENTION TO OVERHEAD WIRES.**
6. Position rig over sample location.
7. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling location, but far enough away from the drill rig so that the crew is not hindered by its presence.



Soil Sampling From A Drilling Rig

Safety-Kleen Consulting SOP Number - 2(B)

Revision Number - 2

Date - February 22, 2001

8. Place sampling gear on the sheeting.
9. Advance the boring to the desired sampling depth.
10. If samples are to be obtained from drill cuttings, retrieve the materials from the drilling slough. Be advised that sample origin, depth, and analyses for VOA constituents cannot be precisely controlled and will be subject to interpretation.
11. Describe the cutting lithology, if required in the sampling plan.
12. If samples are to be obtained from the air cyclone rig, retrieve the materials as they are expelled from the unit.
13. If relatively undisturbed samples are to be obtained, attach either a split spoon or thin walled sampler onto the drilling center rod. Note: The sampler should be attached to the center rod at a drilled depth that is equivalent to the desired sampling depth minus the length of the sampler. For example, an 18-inch split spoon sampler would be attached to the center rod at a depth of 8.5 feet to acquire a driven sample at depth of 10 feet.
14. Drive the sampling tool the entire length into the soil or monofill at the desired depth.
15. Count the number of blows required to drive the split spoon sampler (# blows per six inches), if necessary.
16. Retrieve the soil sampler, open it, and place the tool on the sheeting.
17. Remove the slough from the upper length of the barrel. Slough can be identified because it shows no *in situ* soil textures, and is less consolidated than undisturbed soils.
18. Describe the soil lithology and record the percent recovery, if required in the sampling plan.
19. Homogenize the sample, if specified in the sampling plan. **Do not homogenize for ultra-trace level volatile organics analysis.**
20. Place the properly sized aliquot in the sample container. Make sure that the sampling container contains as much soil material as practical.
21. Attach a label to each sample container. Refer to Safety-Kleen SOP 1 for labeling requirements.
22. Attach the container security seal, if instructed in the sampling plan.
23. Complete the chain of custody form, indicating what analyses are necessary for each sample. See Safety-Kleen SOP 1 for chain of custody requirements.
24. Complete the field logbooks and the field forms, as required in the sampling plan.



Soil Sampling From A Drilling Rig

Safety-Kleen Consulting SOP Number - 2(B)

Revision Number - 2

Date - February 22, 2001

25. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to Safety-Kleen SOP 1 for DOT and Federal Express requirements.
26. Remove all sampling refuse from the sampling site.

REFERENCE

USEPA, 1984, Characterization of Hazardous Waste Sites, A Methods Manual - Volume II, Available Sampling Methods, 2nd Edition, EPA-600/4/84-076

USEPA, 1987, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001

ASTM D 1586 - 84, Standard Method for Penetration Test and Split Barrel Sampling of Soils

ASTM D 1587 - 83, Standard Practice for Thin - Walled Tube Sampling of Soils

ASTM D 1452 - 80, Standard Practice for Soil Investigation and Sampling by Auger Borings



Calibration of Organic Vapor Meter (OVM)

Safety-Kleen Consulting SOP Number - 11 (A)

Revision Number - 2

Date - February 21, 2001

THEORY

The Thermo Environmental Instruments Model 580B Organic Vapor Meter (OVM) operates on the principle of photoionization, whereby the gas or vapor of interest is subjected to radiant energies capable of ionizing atoms (or molecules) of the gas. The OVM uses a 10.2 eV lamp, capable of ionizing any gases with ionization potentials < 10.2 Ev. The lamp and ionization chamber are enclosed by a capacitor, where the gaseous ions drift to a capacitor plate. Contact of the ion with the capacitor plate changes the voltage and current associated with the capacitor; these changes being measured by an electrometer.

SUMMARY

The calibration occurs in two stages; the zeroing stage and the calibration stage. The zeroing stage may be performed either using a zero gas or "background" atmospheric gases. The calibration stage is accomplished with a factory prepared calibration gas designed to produce a given response from the OVM, usually 100 parts per million (ppm). A collapsible plastic bag is filled with a calibration gas. The probe of the OVM is then inserted into a plastic coupling, withdrawing the calibration gas from the bag.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ OVM Model 580B & Manual
- ___ Calibration bag
- ___ Plastic tubing and couplings
- ___ Calibration gas, 100 ppm of isobutylene
- ___ Flow regulator
- ___ OVM calibration logbook, bound, and serially numbered pages

PROCEDURES

1. Insert the power plug into the **Run/Charge** connector.
2. Hold down the **On/Off** button until the pump can be heard and the LCD-readout displays the background readings in ppm.
3. Inflate the gas-collection bag with the calibration (SPAN) gas while the OVM is warming and set aside for later.
4. Press **Mode/Store**



Calibration of Organic Vapor Meter (OVM)

Safety-Kleen Consulting SOP Number - 11 (A)

Revision Number - 2

Date - February 21, 2001

Display = LOG THIS VALUE.

5. Press **-/CRSR** button 4 times.

Display = "RESET" TO CALIBRATE

6. Press **RESET**

Display = RESTORE BACKUP.

7. Press **-/CRSR**

Display = ZERO GAS "RESET" WHEN READY (Note: Use a zero gas cylinder if background atmosphere is not clean).

8. Press **RESET** - the instrument will begin the zeroing process (approximately 1 minute)

Display = SPAN PPM = 0100 (Note: If using calibration gas other than 100 ppm iso-butylene refer to the manual for detailed calibration instructions.

9. Press **+ /INC**

Display = SPAN GAS "RESET" WHEN READY

NOTE: Preliminary considerations

- you must be in a clean atmosphere prior to beginning calibration procedure OR have a zero gas cylinder and separate gas-collection bag available. DO NOT USE THE ZERO GAS BAG FOR THE CALIBRATION GAS OR VISA VERSA.

10. Attach pre-filled calibration gas bag to the probe end of the OVM.

11. Press **"RESET"**

Display = MODEL 580B CALIBRATING



Calibration of Organic Vapor Meter (OVM)

Safety-Kleen Consulting SOP Number - 11 (A)

Revision Number - 2

Date - February 21, 2001

NOTE: OVM will take approximately 1 minute to complete the calibration cycle.

Display = "RESET" TO CALIBRATE **CAUTION: Do not press reset or it will take you through the calibration routine again.**

12. Press **MODE/STORE**

Display = **100 PPM**

REFERENCE(S)

Thermo Environmental Instruments, Inc., Instruction Manual, OVM/Datalogger, Model 580B.

**RCRA FACILITY INVESTIGATION
PHASE I WORK PLAN
EPA IDENTIFICATION No. KSD007246846
SAFETY-KLEEN (WICHITA), INC. FACILITY
2549 NORTH NEW YORK AVENUE
WICHITA, KANSAS**

Environmental Decision Group, Inc.
A Safety-Kleen, Company
5665 Flatiron Parkway
Boulder, Colorado 80301

October 14, 1999

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LIST OF ACRONYMS

AOC	- Area of Concern
ASTs	- Above Ground Storage Tanks
CCl ₄	- Carbon tetrachloride
CDM	- Camp, Dresser, & McKee
CERCLA	- Comprehensive Environmental Response, Compensation and Liability Act (Superfund)
1,2-DCE	- 1,2-Dichlorethylene
DOT	- Department of Transportation
EDG	- Environmental Decision Group
EPA	- Environmental Protection Agency
HASP	- Health and Safety Plan
HEA	- Health and Environmental Assessment
HRI	- Hydrocarbon Recyclers, Inc.
HSAs	- Hollow Stem Augers
HSWA	- Hazardous and Solid Waste Amendments
KDHE	- Kansas Department of Health and the Environment
LES	- Laidlaw Environmental Services
MCLs	- Maximum Contaminant Levels
NIC	- North Industrial Corridor
OSHA	- Occupational Safety and Health Administration
OVM	- Organic Vapor Monitor
PCE	- Tetrachloroethylene (or Perchloroethylene)
PID	- Photoionization Detector
PM	- Project Manager
PNAs	- Polynuclear Aromatics
PRGs	- Preliminary Remediation Goals
QA/QC	- Quality Assurance/Quality Control
RCRA	- Resource Conservation and Recovery Act
RFA	- RCRA Facility Assessment
RFI	- RCRA Facility Investigation
RI/FS	- Remedial Investigation / Feasibility Study
RPD	- Relative Percent Difference
RSC	- Reid Supply Company
S-K	- Safety-Kleen, Incorporated
SOP	- Standard Operating Procedure
SVOC	- Semi-volatile Organic Compounds
SWMU	- Solid Waste Management Unit

APPENDIX G

Standard Operating Procedures (SOP)

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TCA	- 1,1,1-trichloroethane
TCE	- Trichloroethylene
tDCE	- trans-1,2,-dichloroethylene
TPH	- Total Petroleum Hydrocarbons
UPRR	- Union Pacific Railroad
USCS	- Unified Soil Classification System
USEPA	- United States Environmental Protection Agency
USPCI	- United States Pollution Control Inc.
VC	- Vinyl Chloride
VOC	- Volatile Organic Compounds

1. INTRODUCTION

This document provides a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Phase I Work Plan for the Safety-Kleen (Wichita), Inc. (hereinafter referred to as the S-K site or facility) in Wichita, Kansas. The RFI Work Plan has been prepared in response to the following:

- A letter from the United States Environmental Protection Agency (USEPA) Region VII dated April 2, 1998, requesting submittal of a RFI Work Plan within 120 calendar days from receipt of notification, as required by Section VII.4 of the Corrective Action Permit (Part II);
- A letter from the USEPA dated November 19, 1998 providing comments on, historical information for, and requested changes to the Draft RFI Work Plan submitted by Safety-Kleen, Inc., dated August 3, 1998;
- A letter from Kansas Department of Health and the Environment (KDHE) dated November 19, 1998, providing comments and requested changes to the Draft RFI Work Plan; and,
- A letter from KDHE dated July 2, 1999 providing comments and requested changes to the Draft RFI Work Plan.

The RCRA Part I hazardous waste operating permit for this facility was issued by KDHE on March 29, 1995 and became effective on April 7, 1995. Accompanying this operating permit was a Corrective Action Permit (Part II) issued under the authority of the Hazardous and Solid Waste Amendments (HSWA) to RCRA.

This RFI Work Plan is referenced as a Phase I Work Plan, because the scope of work is being conducted in two phases, as allowed in the Part II permit and USEPA's letter dated April 2, 1998. The Phase I RFI Work Plan will address only the non-asterisked solid waste management units (SWMUs) and Areas of Concern (AOCs) identified in the Part II permit (refer to Table 1). This allowance will enable the S-K facility to avoid significant disruption of site operations during the RFI site work. This designation of the initial RFI Work Plan as Phase I indicates that a Phase II RFI Work Plan and report to address the remaining SWMUs will follow at a later date for asterisked SWMUs and Areas of Concern (AOCs) listed on page 22 of the Part II permit.

Additionally, the Phase I RFI will be conducted in stages, in an effort to assess the extent of releases identified on site in an efficient manner. The objective of the first stage, as described within this Work Plan, will focus on initial soil and ground water sampling to identify potential releases from the Phase I

SWMUs and AOCs. Upon completion of the first stage of work, a follow-up Addendum to the RFI Phase I Work Plan will be generated with a scope of work designed to assess the magnitude and extent of impacted soils and groundwater.

As also indicated within USEPA's letter dated April 2, 1998, the scope of work described within this Phase I Work Plan takes into consideration work previously conducted on the facility under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This work is overseen by the KDHE and is coordinated by the City of Wichita for the North Industrial Corridor (NIC) site, and incorporates the subject facility as well as other adjacent facilities in the industrial corridor.

The scope and content of the RFI Work Plan has been prepared in accordance with and/or referencing information from the following documents:

- USEPA, Interim Final RCRA Facility Investigation (RFI) Guidance, Volume I, dated May 1989;
- Section VII of the Corrective Action Permit (Part II);
- RCRA Facility Assessment (RFA) dated September 24, 1990;
- Preliminary Results from Investigation of the 29th and Mead Area, dated June 13, 1996 and prepared by Groundwater Technologies, Inc. (GTI);
- Preliminary groundwater data received from Camp, Dresser & McKee in late January, 1999, completed on behalf of the City of Wichita;
- A variety of historical documents provided by the USEPA with their letter dated November 19, 1998;
- Historical documents obtained from a file search at the KDHE office in Topeka, Kansas recording site visits by KDHE, and correspondence with historical site owners;
- Aerial photographs of the site vicinity from 1960, 1970, 1983 and 1990; and,
- Sanborn maps containing a portion of the facility from the years 1935, 1950 and 1964.

2. OBJECTIVE AND WORK PLAN ORGANIZATION

The objective of an RFI is to characterize the nature, extent, migration rate, migration direction, migration method, magnitude and potential receptors of hazardous wastes and/or hazardous waste constituents that have been released into the subsurface environment at the subject facility. The objective will be met through implementation of subsurface investigation activities at the site that will be conducted in a phased approach. The Phase I RFI will be conducted in a series of stages to meet the RFI objectives in an efficient manner. Stage 1 of the Phase I RFI will focus on identification of releases in the soil and groundwater and will involve two separate field efforts. The first field effort will focus on soil investigations and the second field effort will focus on groundwater issues. Subsequent stages of the Phase I RFI will primarily focus on assessing the extent of soil and groundwater releases identified in Stage 1, and obtaining estimated rates of groundwater flow and other pertinent information that may affect contaminant migration.

This Work Plan provides the following:

- a description of current site conditions;
- historical background information on the site obtained by Environmental Decision Group (EDG), Inc. at the request of the USEPA;
- details of the proposed field investigation(s),
- a schedule for implementing and completing such investigations and related reports;
- the qualifications of personnel performing or directing the investigations; and,
- the qualifications of the personnel managing the RFI.

This Phase I RFI Work Plan also includes a Quality Assurance/Quality Control (QA/QC) Plan that presents the policies, organization, objectives, functional activities, and specific QA/QC activities designed to achieve the data quality goals of the RFI. Also included in Appendix A is a Health and Safety Plan (HASP) that will be used throughout the RFI field investigations to ensure that RFI activities are conducted in a safe manner and according to applicable Occupational Safety and Health Administration (OSHA) standards.

If other AOCs are identified during the implementation of the RFI, additional investigation activities will be implemented, as necessary, to assess the nature and extent of the release(s). Any additional AOCs identified during this first stage of work will be addressed in the Addendum to the RFI Phase I Work Plan to be generated to address the magnitude and extent of any releases identified. The Addendum to the RFI Phase I Work Plan will be submitted for approval to USEPA and KDHE.

Upon completion of the Phase I RFI fieldwork, the resulting data will be reduced, analyzed and summarized in a Phase I RFI report. A separate Phase II RFI and report will be conducted at a future date.

3. SITE DESCRIPTION AND BACKGROUND

3.1. PHYSICAL SITE DESCRIPTION

The facility is located in the NE ¼ of the SE ¼ of Section 4, Township 27 South, Range 1 East from the Sixth Principal Meridian, in a highly industrialized portion of Wichita, Kansas (see Figure 1). The site is bounded by the Coastal (formerly Derby) Refinery to the south and west, Union Pacific Railroad (UPRR) yard to the north, and New York Avenue and Interstate 135 to the east (Figures 1 and 2).

Wichita is located in the east central portion of Sedgwick County, Kansas. The S-K facility lies within the Arkansas River drainage basin, and is within the Arkansas River Lowlands section of the Central Lowland physiographic province. The Great Bend Lowland, which includes the City of Wichita, is characterized as a relatively flat, smooth plain, with local relief of up to 300 feet. The S-K facility is characterized by minimal relief with surface elevations varying from 1310 to 1320 feet above mean sea level (msl) (PRC Environmental Management, Inc., 1990).

3.2. SITE OPERATIONS

The site is currently a waste management facility for S-K, although it has been used for a variety of industrial purposes over the last forty (40) years. The industrial district in which the facility is located was developed over the last ninety-five (95) years. The S-K facility currently operates under a RCRA permit (EPA Identification Number KSD007246846) dated March 29, 1995. The facility is permitted to conduct regulated waste management activities including the storage, treatment, and recovery for recycling of hazardous and non-hazardous wastes. Wastes that are received at the facility are reclaimed or directed to an appropriate facility for handling.

The types of wastes managed in the RCRA-regulated SWMUs are identified in the RCRA Permit (Part I). The list includes paints (and related wastes), batteries, fluorescent lights, incinerable hazardous solids, lab packs, mercury, household hazardous wastes, off-specification and production wastes from industries, waste solvents, plating wastes and corrosives.

3.3. HISTORICAL SITE USAGE AND BACKGROUND

Prior to acquisition by S-K, the site was owned and operated by other companies for a variety of uses over the last 45 years or more. As previously stated, this vicinity of Wichita has been an industrial district for the past 95 years. RCRA operations began at the site in 1979 with Reid Supply Company (RSC). Conservation Services, Inc. purchased certain assets, including the permit, from RSC in 1986.

Hydrocarbon Recyclers, Inc. (HRI), a subsidiary of U.S. Pollution Control, Inc. (USPCI), acquired Conservation Services, Inc. in 1988. Laidlaw Environmental Services (LES) purchased USPCI in 1995; LES changed the name to Safety-Kleen Corp. (S-K) after acquiring S-K in 1998. Table 2 provides further information on the historical ownership of the facility.

At the request of the USEPA in a site visit on September 15, 1998, S-K agreed to obtain, review and evaluate the following items to supplement information presented in the RFA: 1) historical Sanborn maps of the site; 2) historical aerial photographs; and, 3) historical files from the KDHE file on the site. The findings and observations of these reviews are summarized below.

3.3.1. SANBORN MAPS

Sanborn maps for the site area were obtained for the years 1935, 1950, and 1964. However, the coverage of the site area was sparse and only the northwestern corner of the site was included on these maps. In the 1935 map, this area appears void of buildings or any identifiable structures. The railroad tracks to the north of this area (on UPRR's property) are visible on each of the maps, and a round house and car shop are obvious just north of the tracks on UPRR's property in the two earlier maps. By the 1950 map, residential dwellings and garages are present in the northwestern portion of the site represented on the map. These dwellings are still present in the 1964 map as well. Copies of the portions of these maps that include the northwest corner of the site are included in Appendix B.

3.3.2. AERIAL PHOTOGRAPHS

Aerial photographs were obtained in stereo pairs for the site vicinity from the years 1960, 1970 and 1990. A single blueprint copy of an aerial photograph of the site was obtained for 1983. Copies of the aerial photographs along with figures summarizing the details observed are provided in Appendix C. Observations made from the photos are also summarized below:

1960 - At this time it appears that most activities at the facility were carried out on the western portion of the facility, in the vicinity of Buildings D and B. The western half of Building C did not exist yet, and several other buildings (I, G, parts of B and E) were not yet built. Several small buildings (sheds) were present north of Building J, and what appears to be a mobile trailer sat west of Building B and the topographic depression discussed below. Railcars are parked to the north of Buildings C and D. A portion of the far west end of the current property was then occupied by what appear to be private residences. (Note: The Sanborn maps confirm this.) The north end of this area was undeveloped at this time.

The processing area tanks west of Building D do not appear to be present at this date. A nest of above ground storage tanks (ASTs) existed between current Buildings D, G, and B. A loading dock is located about 150 feet south of Building C. A shallow square topographic

depression (possibly a lagoon) lies west of Building B. It appears that the area along the southern property line, east of current Building B (where Building A now stands), was used for outdoor drum storage and as a parking lot. An unidentified, low, triangular, positive topographic feature is located in the northwest corner of the eastern most portion of the site. Dirt roads are leading to the mounded area. The northeastern-most corner of the eastern portion of the site has small, low, small nondescript waste piles and dirt access roads.

1970 - By 1970, most of the currently existing buildings found on site are present, except for Building G. The private residences located on the westernmost portion of the property in the 1960 photograph are now gone, and most of the land in this area is cleared and unoccupied. Building C extends to its present western limits. The processing area tanks occupy the area west of Building D, along with another small building not currently on site. A gondola is present south of Building C.

ASTs are present north of Building I. The ASTs in the vicinity of Buildings D, G and B (see 1960 photo description above) are no longer present in this photo. Also, a line of tall structures that may have been ASTs are parallel to the tracks, where Building G is now located. The topographic low, believed to be a lagoon (west of building B), still exists and appears to be maintained as a square feature with low berms. The adjacent mobile trailer in the 1960 photograph is gone. A part of the open area west of the lagoon and south of the east half of building C is occupied by a large outdoor storage area of drums that appear to be stacked several high. The drum storage pile is over 100 feet long and up to 100 feet wide. The loading dock seen in the 1960 photo is gone. Another smaller, elongated mound is present north of Building J. East of building J are four lines of unidentified storage buildings or possibly four parked tractor-trailers.

1983 - The drum dock currently located south of Building C along the southeastern corner does not exist in this photo. Numerous long items are located in this area, possibly for storage. The structure east of Building C, identified in the 1970 aerial photo, is still present. Several tall structures (possibly ASTs) are located in the current processing area, in addition to two areas that appear to be for storage. There are two structures adjacent to Building H, one to the east and one to the west, that are approximately 7 to 10 feet wide. These may represent some type of storage containers. A variety of storage areas, including what appear to be drums and long storage bins are located throughout the southwestern corner of the site. There also appear to be trailers parked in several locations in the northeastern portion of the site. Possible trailer storage or outside bulk storage is seen in the northeastern-most corner of the site. There appear to be ASTs centrally located north of Building J, and some type of structure and possibly ASTs in the vicinity of the former still area.

The ASTs seen in the 1970 photo are no longer visible north of Building I. The topographic mounds and depressions noted in the 1970 aerial photo are no longer present.

1990 - Activity at the site on this day appears minimal, and both vehicle and rail traffic are sparse. The ASTs north of Building I and the possible ASTs located where Building G now exists are not visible. The dry gondola is gone and the land south of Building C is cleared and unused except for trailer parking. The topographic low/lagoon west of Building B is gone. The former drum storage areas are now clear. There is standing water near the site.

3.3.3. HISTORICAL RECORDS SEARCH

In January 1999, EDG conducted a file search of the KDHE files for the S-K facility to supplement the small amount of historical records and data that S-K had after acquiring the site from previous owners. Documents containing subsurface analytical data or information on potential historical sources of environmental impacts were obtained. These documents were reviewed and summarized in the table provided in Appendix D. Those documents summarized below appear to pertain the most to potential site environmental impacts.

- Internal KDHE documents discussing analytical data from water samples collected from Chisolm Creek in 1994 and 1995, located southeast and presumably downgradient of the S-K facility. The results indicated the presence of volatile organic compounds (VOCs), some exceeding Maximum Contaminant Levels (MCLs).
- Communications were documented between KDHE and the facility (HRI) in 1992 and 1993 regarding the identification and removal of the buried paint can pit located west of Building B.
- A soil-gas survey was conducted in the winter of 1992 by PRC on behalf of the USEPA. The results indicated the presence of chlorinated VOCs and aromatic compounds in the vadose zone in the vicinity of some of the site operations. No sampling location map was provided; only a vague description of sampling areas is given, but it is insufficient to relocate sampling locations accurately on a map.
- In 1984, RSC was fined for storing 1300 drums on the site when the permit only allowed for 500 drums. It was noted during the KDHE site inspection that the drums were in deteriorated condition and leaking onto the ground.
- In 1980, an anonymous caller reported that RSC was dumping drums of re-distilled solvent sludge/solution into a propane tank that had been cut in two, in the southwestern corner of the site. KDHE required discontinuation and reclamation of this operation, which was confirmed by KDHE in November 1980.

- In 1978, a KDHE letter to RSC documented a site visit in which it was noted that waste solvent and still bottom sludge were being diverted under a fence-line into a small drainage channel that runs along the northeastern property line (the tree-lined area in the 1970 aerial photograph). The channel feeds into the East Fork of Chisolm Creek. The letter also noted that still bottom sludges were being dumped on the roofs of the site buildings, and that the acid repackaging rinse water pit was being discharged into the same small drainage channel. A color copy of photographs taken during that site visit are included in Appendix D.
- Site visit documentation by KDHE also confirms the presence of outdoor storage areas of drums noted in the 1970 aerial photographs (stacked on top of each other) and in poor condition. The areas described in the site visit reports seem to correlate with the locations described in the aerial photos.

3.4. NEAR-SITE ENVIRONMENTAL IMPACTS

In 1983, the USEPA initiated an investigation into groundwater contamination in the vicinity of the S-K facility when two industrial wells in the Twenty-Ninth Street and Mead area, located north and up-gradient of the S-K facility, were found to have elevated concentrations of VOCs. The VOCs identified included trichloroethylene (TCE), carbon tetrachloride (CCl₄), trans-1,2,-dichloroethylene (tDCE), vinyl chloride (VC), and 1,1,1-trichloroethane (TCA).

Over time, two listed CERCLA sites were identified in the site vicinity. These sites are now combined, de-listed and referred to as the North Industrial Corridor [NIC]. After several investigations, it has been determined that there are two separate plumes that are multi-source, multiple constituent contamination problems, with both historical and current potential sources. The plumes both originate up-gradient of the S-K facility, cover approximately five (5) miles total in length, and generally trend north/south. The City of Wichita has taken jurisdiction over the NIC project, with input from KDHE and USEPA. A technical oversight committee was formed, which is comprised of representatives of the local industries that may have contributed to the NIC plumes. The technical work is being conducted for the City by Camp, Dresser, McKee's (CDM) Denver, Colorado office. Recent data in draft format was provided to S-K for the purpose of writing this work plan by CDM (see Appendix E).

3.4.1. PREVIOUS SITE INVESTIGATIONS

The following provides a list of available documents summarizing previous investigations at or near the site:

- February 18, 1987, Preliminary Findings - Contamination at 29th and Mead, Wichita, Kansas, Department of Health and Environment Bureau of Environmental Remediation
- September 24, 1990, Draft Preliminary Assessment Report, PRC
- September 24, 1990, Groundwater Sampling and Analysis, HWS Technologies
- December 20, 1990, Transmittal letter for a report regarding aquifer testing and report excerpts, HWS Technologies
- August 27, 1991, Volume I, Draft Remedial Investigation Report for the 29th and Mead RI/FS
- September, 1993, Expanded Site Inspection, 13th and Washington, Wichita Kansas, Kansas Department of Health and Environment
- Preliminary Results from Investigation of the 29th and Mead Area, Volumes I and II, dated August 27, 1991, Revised on June 12, 1992 and June 13, 1996.

3.4.2. RCRA FACILITY ASSESSMENT (RFA)

An RFA report dated September 24, 1990, was prepared by PRC on behalf of the USEPA. The RFA identified fifteen (15) SWMUs and eight (8) AOCs at the facility. These were later revised into the current list of SWMUs and AOCs presented in the Part II permit, which are summarized in Table 1.

3.5. LOCAL SUBSURFACE CONDITIONS

The following subsections provide an overview of the local geology, lithology, and hydrogeology based on information presented in the NIC reports.

3.5.1. LOCAL GEOLOGY

The shallow geologic units within Sedgwick County are of Permian to recent sedimentary origin. The Wellington Formation, of the Permian System, forms the bedrock under four-fifths of the County, and consists of calcareous gray and blue shale, containing several thin beds of argillaceous limestone, gypsum and anhydrite. The Ninnescah Shale, also of the Permian System, overlies the Wellington Formation and forms the bedrock in the remaining western-most one-fifth of the county (GTI, 1991).

Unconformably overlying the bedrock are unconsolidated deposits of clay, silt, sand and gravel ranging in age from the Pliocene Ogallala Formation to the Recent Age. The contact between the

Wellington Formation and the alluvium associated with the Arkansas River Valley trends north/south east of the Arkansas river, which lies west of the S-K facility (GTI, 1991).

3.5.2. SITE LITHOLOGY

The shallow site soils are characterized by ten (10) to fifteen (15) feet of silt and clay, underlain by alluvial and terrace deposits that consist of fine to coarse sand and gravel. These deposits range in depth from 30 to 40 feet bgs at the facility and are immediately underlain by the Wellington Formation at an approximate elevation of 1275 ft msl (see 3.7.1). The Wellington Formation is approximately 200 feet thick in the vicinity of the facility (PRC, 1990).

3.5.3. LOCAL HYDROGEOLOGY

The terrace and alluvium deposits mentioned above are the most widely used source of groundwater in Sedgwick County. The saturated unconsolidated deposits provide much greater yields than the fine-grained shale bedrock. Although the alluvium and terrace deposits are stratified and lenticular in occurrence, the sand and gravel beds are interconnected. Therefore, the stratified unconsolidated beds respond to long-term withdrawals of groundwater as a single hydraulic unit. The saturated thickness of the alluvial and terrace deposits (i.e., the Neogene sediments) in the vicinity of the facility is approximately 20 feet (PRC, 1990). Groundwater is also obtained in small yields from the weathered zone of the Wellington Formation, though it may be highly mineralized (PRC, 1990).

Precipitation is the primary source of recharge in the Arkansas River Valley. The approximate net average recharge to the unconsolidated deposits in the Arkansas Valley is 20% of the annual precipitation (or 6 inches in years of normal rainfall). The depth to groundwater in the site vicinity is generally less than 10 feet from the ground surface (PRC, 1990).

Quantitative estimates of hydraulic properties have been generated from work performed as part of the NIC activities. In the vicinity of the S-K facility, transmissivity of the alluvium (referred to hereinafter as the alluvial flow zone") was estimated as 50,000 gallons per day per foot ($6.68 \times 10^{-4} \text{ m}^2/\text{s}$). Estimates of hydraulic conductivity for the alluvial flow zone conducted at the Coastal Refinery, just south of the S-K facility, were 200 and 1000 gallons per day per square foot (9.43×10^{-3} and $4.72 \times 10^{-2} \text{ cm/s}$).

The depth to water on the site is expected to be approximately 12 to 14 feet below the ground surface (bgs). The saturated portion of the alluvial flow zone is expected to be approximately 20 to 30 feet thick below the S-K facility. The data available in the site vicinity indicate that this is a semi-confined water-bearing unit, with downward migration of fluids being retarded at the bedrock/unconsolidated deposit interface. The ground water gradient data available for the site is somewhat anomalous.

However, based on local gradient information from the NIC work, we have assumed a general southward hydraulic gradient for the purposes of this discussion.

According to KDHE, Coastal Derby Refinery, located south and generally down-gradient of the site, has been pumping product and ground water from their facility, skimming the product and reinjecting the ground water adjacent to the S-K facility. The quality of the re-injected water is reportedly impacted by VOCs. It should be noted that the reinjection process may be impacting the natural ground water gradient on the S-K facility, and may have impacted the distribution of dissolved VOCs in this area.

3.6. SOIL AND GROUNDWATER QUALITY

3.6.1. SITE SOIL QUALITY

The records search did not identify soil data collected from the S-K facility that would be useful in future placement of soil sampling locations at the site. As previously discussed in Section 3.3.3 of this report, the soil-gas study conducted by PRC on behalf of the USEPA had no sampling location map associated with it; only a vague description of each sampling point was provided. Therefore, no soil data map has been generated from previous site investigations.

3.6.2. EXISTING SITE WELL CONSTRUCTION

Five (5) groundwater monitoring wells currently exist on the S-K facility: HRI-2, HRI-3, UPRR-1, UPRR-2 and RSC-1 (see Figure 3). Understanding the construction of these wells is important to interpretation of the analytical results obtained from them. The construction information for the existing wells is provided below. Understanding the construction of these wells is important to interpreting the analytical results obtained from these wells. This information is provided below.

Based on well information provided by KDHE, both HRI wells are reported to be fully-penetrating wells, screened from the ground water surface to the base of the unconsolidated, uppermost water-bearing unit (i.e., the alluvial deposits). These two wells are located on the down-gradient side of the western portion of the site. HRI-2 is reportedly approximately 43 feet deep, and screened from 15 to 35 feet. (Note: Based on the well construction information, it appears that HRI-2 may have a “blank” or well sump below the screen to collect fines that enter the well.) HRI-3 is reported to be approximately 35 feet deep, screened between 15 and 35 feet.

The UPRR wells are located on the up-gradient side of the eastern portion of the facility. According to KDHE information, UPRR-1 has a total depth of approximately 29 feet, and is screened from 9 to 29 feet, and UPRR-2 has a total depth of 25 feet, and is screened from 15 to 25 feet. The UPRR wells are not believed to be fully penetrating, but appear to screen the shallower portion of the alluvial water-bearing unit.

The RSC well is located on the down-gradient side of the eastern portion of the site, and is reported to be approximately 38.5 feet deep, and screened between 8.5 and 38.5 feet. It is also believed to represent a fully-penetrating well. The RSC well and the HRI wells reportedly extend to the bedrock, and HRI-2 is believed to extend into the bedrock unit with the blank described above. (Note: These reported depths are from a referenced point on the well which is assumed to be roughly equivalent to the ground surface, for the purpose of this discussion.) The total depths of all existing site wells will be measured during the course of the RFI.

3.6.3. SITE GROUND WATER QUALITY

Although groundwater data are available from NIC work completed in the vicinity of the site, the data are a combination of Geoprobe sampling points, and shallow and deep monitoring wells. These data were collected on a variety of sampling dates, and any given data set is incomplete. The groundwater gradient data presently available in the site vicinity are inconsistent and anomalous with the gradient presented for the NIC site as a whole. Therefore, the data was not used collectively to generate concentration contour maps for the interpretation of the current groundwater quality in the site vicinity. However, based upon the information provided from the City of Wichita regarding recent and historic NIC investigations, a series of tables and graphs were prepared for data points on and around the facility from draft data provided to S-K by CDM. These data are presented, along with a map of the approximate sampling locations, in Appendix E. No horizontal surveying or coordinate system was provided regarding the historical data; therefore, these sampling/well locations are estimated based upon the information available at this time.

Based upon the evaluation of these data, the following general conclusions were drawn regarding the occurrence of selected VOCs in the groundwater below the site. (Refer to Appendix E for additional analytical data for the site and surrounding area):

- TCE has recently (i.e., in 1997 and 1998) been reported on site in groundwater samples collected in the uppermost flow zone. The highest concentrations observed at shallow depths collected with a GeoProbe® were in the south central portion of the site (south of Building B) at concentrations of up to 120 µg/l. The highest concentration of TCE recently detected on site from monitoring wells was collected south of Buildings C in HRI-3 (230 µg/l). Historically, concentrations of TCE in this portion of the site were higher. In 1989, a concentration of TCE was detected in well HRI-2 at 1000 µg/l, and in 1987, in well HRI-3 at 6260 µg/l.
- Tetrachloroethylene (PCE) has recently been reported on site in groundwater samples collected with a GeoProbe® from shallow depths at concentrations of up to 130 µg/l. The highest concentrations were identified south of Buildings C and B. PCE has also recently been detected in monitoring well data up to 68 µg/l in HRI-3, located in the southwestern portion of the site.

- CCl₄ has recently been reported on site in groundwater samples collected at or near the base of the alluvial flow zone at concentrations ranging up to 19 µg/l. A concentration of 550 µg/l of CCl₄ was reported in a groundwater sample from monitoring well HRI-2 (located in the south/central portion of the site) in April of 1989.
- The graphs generated of selected chlorinated VOC concentrations over time indicate that concentrations were highest in the late 1980s, and have significantly decreased with time. Other aromatic and chlorinated VOCs have also been detected on site in the last 10 to 12 years, and are presented in tabular form in Appendix E.

The source area related to these findings has not yet been confirmed.

3.7. SWMU AND AOC DESCRIPTIONS

The locations of the SWMUs and AOCs to be addressed in this Phase I Work Plan are presented in Figure 2, and Table 3 presents a description and background on each. With the exception of the paint can burial pit, no previous investigation or sampling has been conducted on these SWMUs or AOCs. The impacted materials in the paint can burial pit were excavated in 1992, removed and transported off-site for proper disposal. Although soil sampling data and site personnel confirmed the residual soils were clean, the analytical testing conducted was not in accordance with standard closure requirements. Therefore, additional sampling will be conducted in this area during the Phase I RFI.

4. PROJECT MANAGEMENT PLAN

Environmental Decision Group, Inc. (EDG) is preparing and implementing this work plan on behalf of the Safety-Kleen (Wichita) facility. EDG intends to use a project management plan to actualize the technical objectives established for this RFI Work Plan within the schedule agreed upon by S-K and the regulatory agencies. The following subsections provide details on the selected project personnel and the anticipated project schedule.

4.1. PROJECT PERSONNEL

The professional profiles of EDG personnel involved with implementation of the S-K facility RFI are presented in Appendix F in alphabetical order. The primary responsibility lies with the EDG project manager (PM). The PM will ensure that the RFI is conducted in a timely, cost-effective manner, meeting the objectives of the RFI Work Plan and related schedule. All project task personnel will report directly to the PM. Ms. Kay Tauscher will be the PM for the Wichita RFI and works from the EDG Boulder, Colorado Office. Ms. Tauscher is a Certified Professional Geologists in six (6) states, with over fourteen (14) years of environmental consulting experience. She has managed many site investigations varying in size at RCRA, CERCLA, Brownfield and unregulated sites.

The Project Manager will communicate with the facility environmental coordinator, Mr. Ron Robertson, the key contact person at the facility regarding the RFI, who reviews the scope of work. Open, clear communications with all agency and key facility personnel will be maintained. EDG recognizes that the oversight role of the agencies requires direct access and knowledge of all key project steps, such as field activities, laboratory testing, and community relations activities.

Ms. Carol Edson, a Senior Engineer, will be responsible for senior project management oversight. Ms. Edson has thirteen years of environmental project management and technical experience, focusing on regulatory enforcement sites. Her responsibilities will include primary review of deliverables and senior oversight of project management, staffing, and regulatory issues. Her experience includes interaction with USEPA Region VII on an RFI.

Shawn Leppert, Principal Hydrogeologist, will provide senior technical oversight on the project. Mr. Leppert will review the technical scope of work, and provide expertise on technical issues such as fate and transport and sampling strategy. Mr. Leppert has extensive experience in the analysis of complex groundwater systems and the fate and transport of contaminants. He also has experience on conducting an RFI within USEPA Region VII.

Throughout the RFI process, Ms. Susan Flack, a Senior Toxicologist, will provide guidance on appropriate risk-based action levels and cleanup objectives, as needed. Ms. Flack will also have primary responsibility for generation of the Health and Environmental Assessment (HEA). Ms. Flack has ten (10) years of experience preparing risk assessments and providing environmental consulting services.

The project team individuals will not be replaced without prior notification to USEPA and KDHE. The project personnel conducting the field activities for the RFI will not be identified at this time to retain operational flexibility. The EDG PM will be on site, at a minimum, at the initiation of the field work to assist in sampling location identification, make any necessary modifications to the sampling plan or locations based upon site conditions, make key observations related to specific SWMUs, and to ensure a smooth start to the sampling program.

4.2. PROJECT SCHEDULE

The proposed schedule for the Phase I RFI task implementation and completion is presented in Figure 4. For the purposes of this schedule, we have assumed that USEPA and KDHE will review and return comments to all deliverables within four weeks of submittal. If further agency comments require amendments to the Work Plan, or the agency requires additional review time, the start date will change, thereby extending all subsequent dates accordingly. Also reflected in the schedule are the two separate Stage 1 field efforts for the soil investigation and the groundwater investigation.

The schedule also includes another meeting with the agencies to review the Addendum to the Phase I RFI Work Plan, upon its completion. Since the scope of work related to the Stage 2 field effort(s) cannot presently be anticipated, the amounts of time assumed to complete the associated field work and data evaluation are approximate and will be revised, as needed.

This schedule will be periodically reviewed, updated and forwarded to USEPA and KDHE as work progresses.

5. PHASE I – STAGE 1 RFI SAMPLING PLAN

The purpose of the RFI Sampling Plan is to establish methods and guidelines to assess the presence and magnitude of potential releases from the identified SWMUs and AOCs into the subsurface environment at the S-K facility. Adherence to the guidelines provided within this sampling plan should ensure the data collected are representative of the site subsurface conditions and indicate which of the identified SWMUs and AOCs may have contributed to historical environmental impacts. The plan is divided into three general sections: Field Observations & Sampling Techniques; Laboratory Testing; and Reporting.

In order to meet the objectives, the Phase I RFI will be conducted in multiple stages. Each stage of the Phase I RFI will include both soil and groundwater investigations. Stage 1 of the Phase I RFI will focus on the following: 1) the collection of shallow soil samples to assess potential releases into the subsurface environment in the vicinity of the identified SWMUs, AOCs and other possible areas of environmental impacts; and, 2) the collection of groundwater data to assess the hydraulic gradient and the groundwater quality, both entering the site and on the site. These two efforts will be conducted as separate, subsequent field events so that the results of the first field event can be used to utilize the data collected initially to modify the subsequent field effort, as needed. Any proposed modifications that significantly deviate from this Phase I RFI Work Plan will be presented to USEPA and KDHE for their review and approval prior to implementation.

Upon completion of the separate field efforts for Stage 1, the data will be evaluated to assess the presence of a historic release, specifically in the vicinity of the identified SWMUs and AOCs. For those areas of the site identified in the initial two field events as having releases, a follow-up scope of work will be generated to further assess the magnitude and extent of impacted soil and groundwater, as needed. This scope of work will be described in the Addendum to the Phase I RFI Work Plan to be submitted to the KDHE and USEPA for review prior to implementation. It will include draft summaries of the data generated in Stage 1 of the Phase I RFI.

The RFI field effort will be conducted in accordance with the scope of work and field methods outlined within this Work Plan. This section of the Work Plan provides a description of the subsurface utility/infrastructure survey to be conducted prior to initiation of the field activities, the sampling rationale, locations, procedures, and materials handling for the RFI. SOPs are provided in Appendix G for specific field tasks, as described below.

5.1. SUBSURFACE UTILITY SURVEY

Prior to the final placement of the sampling and monitoring well locations, a subsurface utility survey will be conducted to identify utilities below the ground surface, and to the extent possible, other subsurface infrastructure. The identified underground lines/structures will be marked with spray paint for future reference during the course of the field investigation. The local utility locate number will be called to identify main utility lines near and on the site to the extent possible. We anticipate the survey will also include an onsite survey to be conducted by a subcontractor, to locate site-related infrastructure that does not fall under the local utility jurisdiction.

The utilities identified on site will be noted on a site map, and will be avoided during initial drilling/probing activities for safety purposes and to avoid damage to underground lines. However, locations of the utilities or infrastructure will be considered in the placement of sampling locations. (In other words, initial sampling locations will be placed in close proximity to these structures, if deemed appropriate, to assess possible migration of contaminants along these linear structures.) Should the initial findings of the Stage 1, Phase I RFI suggest that the presence and extent of a given release may have migrated preferentially along a utility line or its related backfill, then a more detailed scope of work will be developed to conduct an investigation of the utility line in question during Stage 2 of the Phase I RFI.

5.2. FIELD OBSERVATIONS

Prior to conducting any intrusive sampling of the site subsurface, a site walkover will be conducted to further refine the sampling locations and rationale. The site walk-through will note the findings of the utility locate, stressed vegetation, subsurface infrastructure, overhead power lines, signs of potential environmental impact, and locations of building entryways and windows. Current site operations will also be taken into consideration to minimize disruption. Based upon the observations made, the exact sampling locations may be slightly modified (i.e., moved up to 25 feet maximum) prior to the field effort to address areas of concern noted during the walk through. However, to the extent possible, the sampling points (especially those for soil sample collection) will be placed in locations believed to have the greatest potential for impact in a given SWMU/AOC area.

5.3. SOIL SAMPLING

Soil samples will be collected using a GeoProbe® direct-push technique. Samples will be logged, collected and shipped to a certified laboratory for subsequent analysis to characterize the shallow site subsurface conditions. The following sections of the Work Plan provide details of the sampling rationale, proposed sampling locations and depths, and sampling procedures.

5.3.1. SAMPLING OBJECTIVE AND RATIONALE

The primary objective of Stage 1 of the Phase I RFI is to identify the areas with the greatest potential for historical environmental impacts for each SWMU and AOC, and sample from these areas to assess whether releases occurred. Stage 2 of the Phase I RFI will be conducted to assess the extent of releases identified in Stage 1. In order to address comments of the KDHE and USEPA on the draft Phase I RFI Work Plan, the sampling program has been amended to provide more lateral coverage across the site in the vicinity of the SWMUs/AOCs. The number of shallow boring locations has increased from twenty-two (22) to forty-two (42) in the revised Phase I RFI Work Plan. Additionally, five (5) exploratory direct-push technique sampling cores will be placed in the general locations of the monitoring wells to be installed (see Section 5.4.1) to obtain continuous cores. The soil sampling approach is outlined in more detail below.

The soil sampling locations and related analyses have been selected based on the following items:

- Locations of the Phase I SWMUs and AOCs;
- Potential source areas as identified through the KDHE records search, Sanborn map and aerial photograph review, a limited number of previous site investigation reports, and NIC data provided by the City of Wichita;
- The utilization of the particular SWMU or AOC, with respect to specific contaminants potentially stored or handled in a given area;
- Comments from KDHE and USEPA on the draft Phase I RFI Work Plan; and,
- The site visit conducted with the KDHE, USEPA, and S-K personnel in September 1998.

Soil sampling will generally be limited to the upper 3 feet of the vadose zone to assess potential releases to the subsurface, except in areas where elevated PID measurements are observed or where potential releases might be expected at a greater depth. If elevated concentrations of the analytical parameters are detected in a given area, then additional soil sampling will be conducted in a later stage of work to evaluate the full extent of impacts. The exact sampling locations will be finalized in the field, but will be based upon this work plan approach and placed in such a manner as to maximize the potential for identifying subsurface impacts, if present, in a given SWMU/AOC area.

5.3.2. SAMPLING LOCATIONS AND SELECTED ANALYTES

Soil sampling locations are presented on Figure 5, and are primarily based on the locations of the SWMUs/AOCs on site and the site walkover with KDHE and USEPA on September 15, 1998. A total

of forty-two (42) shallow sampling locations are proposed to assess the Phase I SWMUs/AOCs and other potential areas of impacts.

Five additional direct-push method continuously-sampled "cores" (EB-1 through EB-5) will be advanced in the approximate locations of proposed monitoring wells to be installed during the groundwater portion of the Stage 1 field effort. (Note: Wells SK-4 and SK-5 are adjacent to one another and therefore, only one exploratory core will be collected in the vicinity of these two wells.) These boring locations are presented on Figure 5.

The primary objective of the exploratory cores is to assess the subsurface conditions in these locations prior to installation of the monitoring wells to ensure that perched or confined conditions are not penetrated, or that areas of elevated contaminant concentrations are not drilled through during the well installation process. If PID headspace readings collected on the samples collected from these cores suggest elevated concentrations of VOCs may be present in the vadose zone, then laboratory analytical testing of soil samples will be conducted for VOCs to quantify their presence. Discrete groundwater samples will also be collected at 3 depths in each of the exploration borings for analysis of VOCs (see Section 3.4.1). Placement of the proposed monitoring wells may be modified based upon the findings of these exploratory cores. Any changes to the scope of work will be documented and provided to USEPA and KDHE prior to implementation for their review and approval.

As previously discussed, the exact locations of sampling points will be decided in the field prior to the start of the drilling operation based upon the location of infrastructure, physical obstructions, drainlines, cracks in secondary containment, staining on the ground, areas void of vegetation, or other information that may suggest possible impacts from historical operations. Drilling will be conducted in close proximity to locations of subsurface infrastructure (such as utility lines, drain lines, or cracks in asphalt/solid surfaces) if it is suspected that their presence might increase the likelihood of subsurface impacts or provide preferential pathways. However, the location of the sampling point will take into consideration safety factors and will avoid the likelihood of damage to the structure/utility line. Should the findings of Stage 1 of the Phase I RFI suggest that a given release may have migrated preferentially along a subsurface infrastructure or its associated backfill, then a sampling approach will be designed to assess this potential in more detail in Stage 2 of the Phase I RFI.

The sampling locations presented in Figure 5 of this Work Plan may be moved up to 25 feet, as deemed appropriate for field circumstances, in order to collect samples that are most likely to represent potential releases from each SWMU/AOC, for safety purposes, to avoid damage to subsurface infrastructure, and to avoid overhead power-lines, or other such limitations. To the extent practicable, boring/sampling locations will be placed in such a manner as to maximize the potential to identify a release from a given SWMU or AOC, and near the locations generally agreed upon with the agencies in September 1998.

The selected soil sample analytes for a given boring were selected based upon the recent and historical usage of the SWMU/AOC. For example, a minimal amount of pesticides waste was reportedly handled in drums in the vicinity of Buildings C (near the loading dock) and J. Therefore, selected samples collected from these areas will be analyzed for pesticides analysis. Likewise, aromatic hydrocarbons and TPH would be analyzed in an area adjacent to gasoline usage, handling or storage. The selected analytes are presented along with the boring locations (see Figure 5) in Table 4. Historical information on the use of each area may be referenced in Table 3 for each SWMU and AOC. Additional historical information utilized for the analytical parameter selection is presented in Appendices B, C and D, and Section 3.3 of this Work Plan.

Borings have been added (B-35 through B-42, see Table 4 and Figure 5) to address areas with potential for environmental impacts based upon the historical records search and aerial photos. These are specifically placed to assess potential impacts from the following: a lagoon observed in the 1960 and 1970 aerial photographs; the ASTs observed in the central portion of the site in the 1960 aerial photograph; the tall structures thought to have possibly been ASTs in the 1970 aerial photograph (currently adjacent to Building G); the drum storage area directly east of Building A in the 1960 aerial photograph; the still bottoms trench extending from the historical distillation process that took place in the northeast portion of the site to the nearby ditch; waste solvent tanks and associated handling that occurred in the northeasternmost portion of the site; and, acid tanks that were reported to exist in the northeastern portion of the facility. Other areas identified for potential sampling based on historical information have sampling locations associated with SWMUs/AOCs.

Each sampling point will be surveyed into a coordinate system upon completion for horizontal and vertical control into a site grid that will be established for current and future reference to assist in accuracy of relocating sampling locations. The coordinate system will be the same as that used for surveying the monitoring well locations.

5.3.3. SOIL SAMPLE COLLECTION

The forty-two (42) soil sampling locations will generally be collected between 0 and 3 feet bgs, unless otherwise noted in Table 4, using a GeoProbe® Macro-Core Soil Sampler, or a similar type of direct push method of advancing soil borings. Each soil sample will be logged in accordance with the USCS, noting odors, discoloration, staining or other visible evidence of impacts. The boring logs will be included in the Phase I RFI report. Section 5.3.4 discusses the specifics of the sampling approach to be taken across the site.

The sampling equipment will be decontaminated between sampling locations by either steam cleaning or a wash/rinse combination, depending on the piece of equipment, to minimize the potential for cross-contamination between sampling locations. The water will be collected in drums, treated on site (if

possible), and discharged according to the facility's applicable permits. These procedures will be conducted as described in Section 7.1.5 and in accordance with standard operating procedure (SOP) # 9 and 10 (Appendix G).

5.3.4. SAMPLING INTERVALS AND SELECTION

With the exception of borings B-4, B-25, B-26 and B-35, the following approach will be taken to collect soil samples for analysis:

- At unpaved boring locations, a shallow soil sample will be collected at 0 to 4 inches and analyzed for the list of parameters for that location presented in Table 4. Each of these borings will be advanced to 3 feet bgs and field-screened using a PID (see SOP #30-A in Appendix G) to assess the potential presence of VOCs. If PID measurements are observed above background concentrations, then the boring will be extended to the ground water table and the soil sample with the highest PID reading that is not within 1 foot of the ground water table will be collected and analyzed for VOCs. This sampling rationale should assist in assessing whether VOC compounds are present at concentrations that warrant further action in the vadose zone.
- At paved boring locations, an initial sample will be collected at 1 – 3 feet bgs for subsequent laboratory analysis of the parameters listed in Table 4 for that location. PID measurements will be collected from each 2-foot interval. If the PID measurements are above background concentrations, then the boring will be extended to the ground water table. The 2-foot sampling interval with the highest PID reading that is not within 1 foot of the water table will be selected for laboratory analysis of VOCs.

The samples collected from borings B-4, B-25, B-26 and B-35 (the paint can burial pit, the concrete vault, and the former lagoon areas) will be collected from depths determined in the field based on PID measurements, the anticipated depth of a potential release and visual observations of the boring. The sample expected to represent the highest concentrations of potential impacts based on these items will be selected for laboratory analysis of the constituents outlined in Table 4 for the respective location.

5.3.5. ANALYTICAL TESTING ON SOIL SAMPLES

The list of target analytes for this stage of the Phase I RFI Work Plan have been selected based on a review of the site history as identified in facility files, KDHE files, SWMU/AOC uses, and available pertinent site information and data. Table 4 lists the analytical parameters for the specific sampling points, and which SWMU/AOC area the sampling point is intended to assess. The method descriptions, method reference numbers, preservation required and minimum amount of sample required are provided in Table 5.

In Stage 1 of the Phase I RFI, samples selected for analysis from each boring will be analyzed for a combination of the following parameters: pH, the RCRA Appendix IX metals semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), pesticides, polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene and xylenes (BTEX), and VOCs. Based on available information regarding the primary waste streams handled over much of the site, VOCs, pH and the inorganic compounds are the most prevalent analytical parameters selected across the site. TPH, PAHs and BTEX analyses are selected in those areas potentially impacted by certain hydrocarbon products or wastes (such as gasoline or diesel fuel). A few select areas were chosen for pesticides analysis, based upon a minimal amount of pesticides waste handling that occurred in limited areas. Analysis of SVOCs is also included in areas where a variety of waste streams may have been handled.

5.4. GROUNDWATER DATA COLLECTION

The groundwater data collection in Stage 1 of the Phase I RFI will focus on two primary objectives:

- To more accurately assess the groundwater gradient and direction of flow across the site;
- To assess both the background (i.e., up-gradient) and on-site groundwater quality; and,
- To identify data gaps that will be filled in future investigative phases to complete the vertical and horizontal assessment of contaminant plumes that are found to originate from the facility.

These objectives will be met in Stage 1 of the Phase I RFI by the following tasks:

1. Collection of discrete-depth water samples for VOC analysis using direct-push method from three (3) depths within each of the five (5) exploratory borings and three (3) selected borings from the interior of the site;
2. Install and develop additional groundwater monitoring wells in the shallow and deeper portions of the shallow groundwater flow zone;
3. Establish a horizontal coordinate system into which existing and new sampling and monitoring points will be surveyed;
4. Obtain vertical control of existing and new monitoring wells (both on and upgradient of the site) by surveying the well elevations to an established benchmark;
5. Obtain a complete round of gauging from both existing and new monitoring wells both on and up-gradient of the site; and,

6. Sample and analyze new and existing groundwater monitoring wells on and up-gradient of the site for constituents of concern.

These tasks are described in more detail in the following subsections of the Work Plan. Additional objectives will be outlined, as needed, in subsequent stages of the Phase I RFI.

As previously stated, a second stage of the Phase I RFI is anticipated to focus on assessment of the extent of potential site plumes identified in the first stage.

5.4.1. DISCRETE VERTICAL GROUND WATER SAMPLING

Ground water samples will be collected from selected borings at three (3) discrete depths in the ground water column using direct-push methodology. This sampling will be conducted to assess the vertical stratification of dissolved constituents that may exist. The data will also be used to modify, as needed, future ground water monitoring well placement and/or construction. These data will not be intended to represent the overall ground water quality of the aquifer.

Discrete ground water sampling will also be conducted in each of the exploratory borings discussed in Section 3.2.2. Additionally, three (3) of the forty-two (42) borings proposed for the boring program will be extended to the shale bedrock in order to obtain three (3) discrete ground water samples from locations in the interior of the site. These locations will be selected in the field based on field observations and PID measurements. An effort will be made to spread these selected locations across the site.

This discrete ground water sampling will occur in the first field effort of the Stage 1, Phase I RFI.

5.4.2. MONITORING WELL INSTALLATION AND DEVELOPMENT

The second field effort of Stage 1 will begin with the installation of: five (5) wells screened in the upper portion of the alluvial flow zone (SK-1, SK-2, SK-3, SK-4 and SK-6); and one (1) monitoring well screened at the base of the alluvial flow zone, just above the bedrock (SK-5). The approximate locations of these wells are presented on Figure 3. Proposed monitoring wells SK-3, SK-4, and SK-5 will supplement the existing UPRR-1 and UPRR-2 wells (Figure 3) in monitoring background (i.e., upgradient) groundwater quality entering the site. SK-1, SK-2 and SK-6 will supplement the existing RSC-1, HRI-02 and HRI-03 wells in monitoring groundwater quality down-gradient of the site operations.

The wells will be drilled using hollow stem augers (HSAs). Since exploratory borings will have already been placed in these locations during the soil investigation portion of the Stage 1 of the Phase I

RFI field effort, then no additional soil sampling will be conducted during the monitoring well installation process.

As presently envisioned, the wells will be constructed of 2-inch diameter, Schedule 40, flush threaded polyvinylchloride (PVC), with 10-foot machine slotted (0.01-inch) well screen. To the extent possible, the wells screened in the shallow portion of the alluvial flow zone will be installed at a depth that monitors the uppermost portion of this water-bearing unit. Consideration will be taken to account for seasonal fluctuations in the depth to the ground water surface. Likewise, to the extent possible, the well to be screened in the deeper portion of the alluvial flow zone (SK-5) will be installed with the base of the screen at the bottom of the unconsolidated deposits, atop the shale bedrock.

Based upon the information available on the facility to-date, we do not anticipate encountering confined conditions at the top of the alluvial flow zone, or perched conditions in the clay/silt vadose zone. However, the exploratory borings conducted in the locations of the monitoring wells should confirm this information prior to the installation of the wells. As previously discussed in the Work Plan, based upon the information collected during installation of the exploratory borings, monitoring well locations may be modified prior to the groundwater investigation portion of Stage 1 of the Phase I RFI. These types of modifications would be presented to USEPA and KDHE prior to implementation of the groundwater investigation.

The annular space around the screen will be filled with clean silica sand that will extend to 1 to 2 feet above the top of the screen. A bentonite seal, approximately 2 feet thick, will be placed above the sand pack. The annular space will then be grouted to the ground surface with a neat cement mixture (i.e., a bentonite/cement slurry). The wells will be completed with locking flush-mounted covers. Variances will be obtained from the state to complete the wells as flush-mounted wells. SOP #6-A (Appendix G) provides additional details regarding well construction.

The new and existing wells will be surveyed into a horizontal grid system and into an elevation system by a licensed surveyor. To the extent practical, we will try to coordinate these systems with other nearby NIC data surveying systems in order to better correlate site data with the larger NIC investigations. The wells to be surveyed on UPRR's property north of the site will also be surveyed into the same horizontal and vertical control systems (Figure 6).

Each monitoring well installed will be developed in accordance with SOP #6-B (see Appendix G). The soil cuttings will be drummed, sampled, and properly disposed of after completion of the well installation. Development water will be contained in drums, and if possible, treated on site prior to discharge. If proper treatment equipment is unavailable on site, then the water will be taken off-site for proper treatment and disposal. This will be discussed with the site personnel prior to the start of

the field efforts, and the appropriate handling and treatment processes will be finalized at that time. The information will be documented in the RFI report.

5.4.3. FLUID LEVEL MEASUREMENTS

Upon completion and development of the new monitoring wells, and after the wells have had time to stabilize, a round of groundwater level measurements will be collected. The round of gauging will be performed within a given 24-hour period. The gauging will include the existing site monitoring wells (HRI-02, HRI-03, RSC-1, UPRR-1 and UPRR-2), the newly installed wells [SK-1, SK-2, SK-3, SK-4, SK-5 and SK-6], and five (5) selected wells on the southern end of UPRR's property just north and up-gradient of the S-K facility (MW-11, MW-14, MW-15, MW-18, and WND-32 as shown in Figure 6). The UPRR wells are believed to be monitoring the uppermost portion of the alluvial flow zone. However, total depths measurements of each well will be collected during the round of gauging.

The gauging data will then be correlated with the elevation data obtained for each well and used to interpret both a direction of flow and a horizontal hydraulic gradient for the groundwater beneath S-K facility. The fluid level measurements will be conducted in accordance with SOP #7-A (see Appendix G). The data will be collected with an electronic water-level probe, or an electronic oil/water interface probe in accordance with the manufacturer's specifications. The data will be logged in field notebook.

5.4.4. GROUND WATER SAMPLING PROCEDURES

5.4.4.1. Monitoring Well Purging

Prior to sampling each well, the monitoring well will be purged in accordance with SOP #7-B (Appendix G). Purging will generally be conducted until the pH, electrical conductivity, and temperature have stabilized (i.e., when three consecutive measurements are within 10% of each other). These field measurements are collected after each well volume of water is removed until the parameters have stabilized, and a minimum of three casing volumes have been removed. If a well is bailed dry before three casing volumes are removed, the well will be sampled when the volume of water in the well has recovered sufficiently to allow sample collection. Should the parameters not stabilize after the removal of ten (10) well volumes of water are removed, then purging will cease and the well will be sampled. Purging will most likely be conducted using a pump.

5.4.4.2. Field Parameter Measurements

Once the well is stabilized for groundwater sampling, measurement of field parameters will be collected in accordance with SOP # 5 (Appendix G). The following field parameters will be monitored during groundwater sampling: pH, conductivity, temperature, dissolved oxygen, oxidation-reduction potential (redox), and turbidity. All field instruments used to measure these parameters will be

decontaminated by rinsing with distilled or deionized water between uses. All instrument recordings will be noted in the field notebook and groundwater sample collection form (see Appendix G).

5.4.4.3. Groundwater Sample Collection

Groundwater sampling activities will be completed in accordance with SOP #7-C (Appendix G). Groundwater sampling will be performed with unused disposable bailers. When filling VOC vials, water will be slowly poured from the bailer into the sample containers to avoid aeration of the sample. VOC vials will be filled first, and care will be taken to omit air bubbles. Following sampling for VOCs, the other sample containers will be filled. The samples collected for dissolved inorganics analyses will be field-filtered in accordance with SOP #7-D (Appendix G).

Sample containers will be provided by the selected certified laboratory. The containers will be pre-preserved (as necessary) by the laboratory and labeled with indelible ink. The label will include the sample number, project name, date, time, sampler's initials, and type of preservative (if any).

The field log and chain of custody form will be completed, indicating which analytical parameters will be tested for in each sample. The samples will be stored in an iced cooler (approximately 4° C) while on the job site and during shipment to the laboratory.

5.4.5. ANALYTICAL TESTING OF GROUNDWATER SAMPLES

The historical groundwater data available for the site and vicinity indicate that groundwater beneath the site is impacted by VOCs. Hydrocarbon plumes present up- and down-gradient of the site may be enhancing the natural attenuation of the organic compounds in the groundwater beneath the S-K facility. Based upon this information and in an effort to characterize the overall site groundwater quality, the groundwater samples will be analyzed for the following parameters:

- Volatile Organic Compounds
- Methane
- Total and Dissolved Iron
- Total Nitrogen
- Dissolved and Total Manganese
- Dissolved Calcium
- Dissolved Magnesium
- Dissolved Potassium
- Dissolved Chloride
- Dissolved Bicarbonate
- Dissolved Sulfate
- Dissolved Sodium

The method reference numbers and other information on the analytical parameters are provided in Table 5. Modifications to the list of analytical parameters will be made and submitted to the USEPA and KDHE for review and approval, as needed.

5.5. DRILLING MAINTENANCE ACTIVITIES

During the RFI drilling/sampling activities, responsible maintenance practices will be followed regarding collection and handling of decontamination water, soil cuttings and grouting. The soil cuttings collected from the monitoring well installation will be contained on-site in appropriate DOT-approved drums after completion of each borehole until the laboratory analysis is obtained for characterization and proper disposal/handling of the soils. Drum labeling procedures, documentation of the analysis, transport, and disposal of these soils will be included in the final Phase I RFI report.

Decontamination water, well development water, and purge water will also be collected and placed into DOT-approved drums and kept on site until appropriate analytical testing can be conducted and evaluated to determine appropriate disposal methods. The decontamination procedures are outlined in the QA/QC portion of this Work Plan (see Section 7).

6. DATA MANAGEMENT, EVALUATION, AND REPORTING PROCEDURES

6.1. DATA MANAGEMENT

The following techniques will be used to manage the RFI data to effectively review, process, reduce and evaluate the data generated from the facility:

- Labeling of sampling points, borings and the associated logs will follow those outlined in the final approved RFI Work Plan.
- Samples will be labeled by the sampling identification (see Table 4) and the sample collection depth.
- The sampling and monitoring well locations will be surveyed into a site or near-site benchmark and site grid, that will be established in order to accurately locate the boring location whenever needed;
- The organic vapor monitor (OVM) to be used in the field will be calibrated according to the manufacturer's specifications.
- The laboratory data will reference the sample identification as described above; and,
- The analytical data will include the date of sample collection, date of sample receipt, date of extraction/digestion, and the date of analysis. Analytes that exceed holding times for extraction/digestion or analysis will be identified in the Phase I RFI report.

6.2. DATA PRESENTATION

Upon completion of the Phase I RFI field work, the data will be arranged and presented in a clear and logical format within a Phase I RFI report. Tabular, graphical and visual displays of the data will be generated, as deemed appropriate, to best reduce the data into an easily digestible format. For example, the analytical data results for organic compounds will be reduced into tables that include those analytes that were found above method detection limits. Tables generated for the inorganic analytical results will include all of the results, due to the nature of interpretation of inorganic chemistry.

Until the remediation goals for the site are established in the corrective action process, the extent of soil impacts will be compared to levels that are protective of ground water based on USEPA and/or KDHE guidelines. A table of appropriate comparative values will be presented in the Phase I report. Should the concentrations of inorganic compounds identified on site exceed these comparative values, then background sampling will be proposed in the addendum to the work plan for future and more detailed comparative purposes.

Boring logs will be generated to represent the subsurface soil conditions, and these will be used to generate cross sections for the site that are considered representative of the subsurface site conditions. The raw data, such as boring logs and laboratory analytical reports will be included in the appendices of the Phase I RFI report.

The Phase I RFI report will present existing data gaps that might require subsequent investigations, both on and off the site as needed, to assess the full extent of releases from the site, as required in the Facility Permit, Part II, Section VII, 4.C.

6.3. DATA REDUCTION

Data from both stages of the RFI will be reported according to acceptable practices of QA and data validation. Data will not be intentionally excluded from the report, regardless of the results. If the integrity of certain data is brought into question, a discussion of this concern will be included in the RFI report. Standard data evaluation techniques will be used to evaluate replicate measurements, identification of outlier values, and reporting of results determined to be below the detection limits. These items will be handled as follows:

- Replicate samples of a single sample will be averaged prior to further data reduction.
- Outlier values, are values which fall outside of the expected range of results. Because field variability of environmental data can be wide, interpretation of “outliers” can be difficult. Regardless, data deemed to be a statistical outlier will be reported with the raw data in the RFI report, but will be identified as such. An explanation of the outlier will be provided, if determined.
- Analytical values determined to be below the method detection limits will be represented by a “<” symbol, followed by the detection limit value. The data presentation will cite the analytical methods used (see Table 5 for a list of the anticipated methods).

6.4. PROPOSED STAGE 1 ACTION LEVELS

The site soil data collected during Stage 1 of the Phase I RFI will be compared to published appropriate risk-based screening levels, to be agreed upon with USEPA and KDHE during the RFI. For each SWMU/AOC, if the soil concentrations exceed the selected screening level for a given constituent, then further investigation of the constituent will be conducted in the area of the SWMU/AOC in Stage II of the Phase I RFI. In addition, background sampling for inorganic constituents in soils will be conducted in the next stage if initial comparisons to appropriate screening levels indicate exceedances. If needed, background sampling will be used to confirm that background soil concentrations do not exceed appropriate risk-based screening levels. The action levels selected for comparison will be presented in the Addendum to the Phase I RFI Work Plan to be generated prior to the next stage of the Phase I RFI.

6.5. HEALTH AND ENVIRONMENTAL ASSESSMENT

Upon completion of all stages of the Phase I RFI, EDG will conduct a Health and Environmental Assessment (HEA) as a part of the RFI Report. The purpose of the HEA is to develop site-specific health and environmental criteria (e.g., action levels) for comparison to site data. The HEA will identify constituents of concern, potential exposure routes, and use EPA toxicity values and site-specific exposure scenarios to calculate the action levels in accordance with the Risk Assessment Guidance for Superfund, Parts A through D. The results will be used to assess the need for interim corrective measures or a corrective measures study at the facility.

As outlined in the RFI Guidance, the following information will be summarized for use in assessing potential impacts to receptors from exposure to environmental constituents, if present, at the facility. This information will then be presented in an HEA for the site:

- Existing and potential future uses of groundwater in the site vicinity, including the type of usage (industrial, residential, agricultural, domestic/non-potable, etc.)
- Locations of groundwater users within one (1) mile of the facility property boundary, as indicated by state and local agency documents/files.
- Existing and potential future uses of surface waters that receive drainage from the facility, or that are hydraulically down-gradient of the facility groundwater.
- A general description of the ecology of the facility and the surrounding environs, including the identification of potential wetlands areas within one (1) mile of the facility.

- A description of biota (flora, fauna, and bottom-dwelling organisms) in surface waters and associated sediments that drain from the facility area.
- A description of human usage or access to potentially impacted areas.
- A demographic profile of the near-site population, including the sex, ages, and sensitive sub-groups (such as schools, nursing homes, etc.) for the groundwater users in the area of an off-site plume, if present.
- Known endangered or threatened species on or near the facility.

6.6. REPORTING

A final Phase I RFI Report will be generated that describes the following:

- A summary of all stages of the phase I RFI field investigation(s);
- Field methods;
- Pertinent field observations;
- QA/QC results;
- Background sampling results, if deemed necessary;
- Tabular, graphical and visual presentations of the data collected;
- Conclusions drawn from the data collected;
- Conclusions of the HEA evaluation and appropriate action levels;
- Recommendations of Action Levels for Constituents of Concern; and,
- Recommendations for further action, if warranted.

The report will be of sufficient detail to assist in decision-making regarding whether interim corrective measures and/or a corrective measures study are necessary at the facility.

7. QUALITY ASSURANCE / QUALITY CONTROL (QA/QC) PLAN

An effective QA/QC Plan must include a discussion of the quality assurance (QA) elements, which address the nature of a total, integrated effort assuring the reliability of measurement and monitoring data. Quality Control (QC) refers to the specific elements within a QA plan that help ensure the implementation of the QA program.

The QA/QC Plan for this RFI includes the following:

- Organization and Scheduling (refer to Section 4.0);
- Personnel Qualifications (refer to Section 4.0);
- Field QC Elements;
- Laboratory QC Elements; and,
- Data review and validation;

The quality assurance objectives are to produce data of known accuracy, precision, representativeness, completeness, and overall comparability. The goal of the QA program for this Work Plan is to produce defensible data that meets or exceeds the USEPA program guidelines.

The data generated during the project must be subjected to a series of checks and reviews, which are necessary to establish that the data are representative of the environmental conditions at the site. The data QA/QC procedures for this RFI will include, but are not limited to, documentation of field/sampling events, the acquisition and history of study samples and their review, as well as the duplication and analysis of blind standards that establish data integrity. For example, both field and laboratory instruments should be properly calibrated and maintained per the manufacturer's instructions and EPA guidance. Records must be kept to document these efforts, and chemical standards analyzed to ensure the instruments provide correct measurement. Specific procedures are based on standard accepted methods published and used by USEPA. The procedures are based on the types of field and laboratory QC elements used. The QC elements to be used in the field and the lab are provided in the following subsections.

7.1. FIELD QC ELEMENTS

The following subsections (7.1.1 through 7.1.7) of the QA/QC plan review the field QC elements that will be utilized to ensure that valid data are collected from the RFI.

7.1.1. SAMPLE MANAGEMENT

The sampling procedures should ensure that the samples are representative of the media under investigation, unaltered during the collection and processing, and uncontaminated during sampling or analysis. Documentation must be maintained at all stages of the sample acquisition, handling, preservation, and control process.

7.1.2. SAMPLE ACQUISITION

The following specifications should be met during the sample collection in order to generate representative samples of the environmental media of concern:

- The sample must be representative of the media to be evaluated;
- The sample must reflect the concentrations of the hazardous constituents of concern present; and,
- The sample must not be affected by cross-contamination.

7.1.3. SAMPLE HANDLING, PRESERVATION, AND HOLDING TIMES

All samples will be placed in sample containers that have been laboratory cleaned. As samples are collected and containerized, the following information is added to each label:

1. Project Name.
2. Sample Number.
3. Location - Description of place where the sample is collected (for example, well or boring site, depth).
4. Date - A six-digit number indicating the year, month, and day of collection.
5. Time - A four-digit number indicating the military time of collection.
6. Sampler - Initials of Field Engineer or Field Geologist collecting the sample.
7. Remarks - Pertinent observations or further sample description (as appropriate).

Table 5 presents the current USEPA analytical methods, containers, preservation, and holding time requirements for various analyses. After collection, identification, and preservation (in an iced cooler), the sample is maintained under the chain-of-custody procedures discussed below.

7.1.4. SAMPLE CONTROL

Chain-of-custody procedures are intended to maintain and permanently document sample possession from the time of collection to disposal. A sample is under custody if:

1. It is in a person's possession; or
2. It is in a person's view, after being in his possession; or
3. It is in a person's possession and then locked up to prevent tampering; or
4. It is in a designated secure area.

The following procedures will be followed in the field regarding sample handling:

1. Samples will be collected as specified in the sampling plan section of this Work Plan.
2. The Field Geologist will be responsible for the care and custody of the samples until they are transferred or dispatched properly.
3. Chain-of-custody procedures will be reviewed prior to and after sampling by project personnel.

Samples will be accompanied by a Chain-of-Custody Record from the time they are collected until the analyses are performed. When transferring the possession of samples, the individuals relinquishing and/or receiving the samples will sign, date, and note the time on the record. Each shipment of samples will be accompanied by the Chain-of-Custody Record identifying its contents. The original record will accompany the shipment, and a copy will be retained by the Project Geologist.

7.1.5. DECONTAMINATION PROCEDURES

In order to minimize the potential for cross-contamination from sample to sample, the following decontamination procedures will be followed. The drilling and/or direct push equipment be steam cleaned or washed and rinsed between sampling locations, and the water will be collected and drummed for subsequent sampling, analysis, and proper handling. The sampler will be decontaminated between samples with an Alconox®-water solution, and rinsed repeatedly with distilled water. The water will be contained on site, along with the steam cleaning solution, and sampled and properly handled.

7.1.6. FIELD DOCUMENTATION

Maintenance of a field log is an integral field QC element. Information obtained from site investigation activities is recorded in ink. Items included in the field log are:

1. Documentation of field activities;
2. Field data;
3. Unusual events;
4. Personnel on site;
5. Communication with the client or others; and,
6. Written reports of relevant telephone contacts or personal contacts.

7.1.7. FIELD INSTRUMENT QC ELEMENTS

A field instrument will be used to analyze VOC vapors during the soil collection. The instrument will be calibrated per the manufacturer's specifications for technique and frequency. Records will be maintained to document the procedures. The records will include data on:

- Date and time of calibration;
- Nature of analytical standard;
- Extent of adjustment; and,
- Comments.

7.1.8. FIELD QC SAMPLES

The following field QC samples will be collected during the field effort to ensure that the data collected are usable for a statistically definitive study:

- 5% field replicate (or one for every twenty) soil and groundwater samples will be obtained;
- 1 trip blank per cooler will be used and analyzed for VOCs only;
- 5% (or one for every twenty) rinsate samples, or field equipment blanks, will be collected and analyzed for VOCs, SVOCs and inorganics for soil and ground water sampling equipment.

These QC samples are defined as follows:

Blanks (Trip and Equipment Blanks) are used for assessing the presence and degree of contamination contributing to an analytical measurement by field activities, and/or sample transport.

A trip blank is a sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and handling procedures. This type of blank is most frequently used in documenting possible contamination of VOC samples. An equipment blank is a sample of analyte-free water which has been used to rinse the sampling equipment. It is collected after the sampling equipment has been decontaminated and prior to sampling. This blank is useful in documenting adequate decontamination of sampling equipment.

When analysis demonstrates field blank contamination, the corrective action taken will be dependent upon the significance of the contamination, the potential effects on samples collected with the field blank, etc., and will be addressed on a case-by-case basis.

Duplicates or replicates are used to assess the precision of an analytical method or sampling procedure. They are applicable to any analysis but are most often performed for inorganic parameters.

7.2. ANALYTICAL QA/QC ELEMENTS

A USEPA or Kansas-certified laboratory will be selected to perform analytical testing of all samples for this RFI. The following subsections describe the analytical QC elements that will be followed for samples analyzed for the RFI to ensure the validity of the analytical data results. The QC elements are based upon EPA SW-846, EPA Data Validation Guidelines, and laboratory derived control limit criteria.

The scope of this analytical QA/QC program encompasses the policies and procedures issued from the following references:

- Quality control guidelines as provided in the USEPA SW-846 Test Methods for Evaluating Solid Waste, third edition and its updates,
- USEPA/EMSL Handbook for Analytical Quality Control in Water and Wastewater Laboratories, to include statistical techniques contained therein,
- Quality System Requirements for Laboratories: International Standards Organization, ISO/IEC Guide 25,
- Quality System Requirements for Laboratory Registration: International Standards Organization, ANSI/ASQC Q9000, Q9002, and Q9004.

The laboratory's general QA program and custody protocol will be followed to ensure sound laboratory operation. Any deviations from existing analytical procedures must first be approved through both the project manager and representative agency personnel managing the project.

7.2.1. ANALYTICAL QC SAMPLES

The laboratory QA program shall include the analysis of field and laboratory QC samples and the use of certain indicators to ensure that the data produced is of known accuracy, precision, completeness, comparability, and representativeness. These are defined as follows:

- Blanks (Method Blanks) provide a measure of the degree of contamination contributed by the sample extraction/analysis system.

- Laboratory control samples are used for assessing the accuracy of a method (including any preparation steps) in a control matrix. They are applicable to any analytical method in which the analyte(s) of interest can be fortified into the control matrix. A laboratory control sample meeting recovery criteria provides evidence that the method, exclusive of sample matrix considerations, is in control.
- Laboratory control sample duplicates are used for assessing both the precision (relative to the laboratory control sample) and accuracy of a method in a control matrix. A laboratory control sample duplicate meeting Relative Percent Difference (RPD) criteria (and recovery criteria) provides evidence that the method has achieved both the precision (and accuracy) requirements of the method, exclusive of sample matrix considerations.
- Matrix spikes are used to assess the impact of sample matrix on the accuracy of a method. They are applicable to any analytical method in which the analyte(s) of interest can be fortified into the sample matrix. A matrix spike meeting recovery criteria provides evidence that the method, as it applies to the sample matrix, is in control. However, the effect of a matrix on spike recoveries can be highly variable even between samples of the same general matrix type (e.g., water, soil, etc.). Therefore, one cannot necessarily conclude that matrix spike recoveries which do not meet criteria imply an out-of-control situation. Additional QC data such as laboratory control sample and surrogate recoveries (organic analysis) will aid in the evaluation of such events.
- Matrix spike duplicates are used for assessing both the precision (relative to the matrix spike) and accuracy of a method in a given sample matrix. A matrix spike and matrix spike duplicate meeting relative percent difference (RPD) criteria and percent recovery criteria provides evidence that the method has achieved both the precision and accuracy requirements of the matrix under evaluation.
- Duplicates are used to assess the precision of an analytical method or sampling procedure. They are applicable to any analysis but are generally performed for inorganic parameters. Duplicate samples may originate in the laboratory (matrix duplicate) or in the field (field duplicate).
- Surrogates are compounds similar to target analytes in terms of chemical composition, extraction efficiency, and/or method of analysis but which are not normally found in environmental samples; neither are they target analytes. They are added to all samples, blanks, and QC samples prior to sample extraction. Percent recoveries relative to the same surrogate compounds in the calibration standards are evaluated for adherence to established

quality control criteria. The use of surrogates is applicable only to organic analysis. The laboratory QC samples, (types and frequency), will be dictated by SW-846.

7.2.2. ANALYTICAL QC INDICATORS

The following general QC indicators will be used in the data validation process:

- Accuracy is a measure of the nearness of a result to the true or theoretical value. Accuracy limits are from the referenced EPA methods or are internally derived according to EPA guidelines using historical data. For like matrices, internally derived control limits must be statistically equivalent to the corresponding EPA method control limits. Accuracy is measured by calculating the Percent Recovery (P) as follows:

$$P = \frac{\text{Observed Result}}{\text{Theoretical Value}} \times 100$$

or for spiked samples:

$$P = \frac{(\text{Observed Result} - \text{Sample Background Result})}{\text{Spike Value}} \times 100$$

- Precision is a measure of the agreement between a set of replicate measurements without assumption or knowledge of the true value. As with accuracy, precision limits are from the referenced EPA method or are derived internally according to EPA guidelines using historical data.

Precision is measured by calculating the RPD of duplicate analytical results as follows:

$$\text{RPD} = \frac{|C_1 - C_2|}{(C_1 + C_2)/2} \times 100$$

where C1 and C2 are the concentrations
of the duplicate results.

- Completeness is a measure of the quantity of valid data obtained from a measurement system compared to the quantity of total expected data, usually expressed as a percentage.

Completeness is determined using the following equation:

$$C = V/n \times 100$$

where:

- C = Percent completeness
- V = Number of complete, valid measurements
- n = Number of total expected measurements needed to achieve a specified level of confidence in decision making.

- Comparability describes the effectiveness with which one set of data can be compared to another. Comparability is ensured through the use of standardized analytical methods, procedures, and reporting.
- Representativeness describes the extent to which data accurately and precisely represents the true characteristics of a sample. Representativeness is ensured through the use of appropriate sample handling/storage procedures and standardized analytical methods. Efforts are made to ensure that analyses are performed on samples that are representative of the original source. This is accomplished, in part, by ensuring that samples are properly preserved, stored, and analyzed before the expiration of holding times.

7.2.3. ANALYTICAL SAMPLE REPORTS, METHODS AND CALIBRATION PROCEDURES

Analytical data can be presented in a number of formats. These formats are generally based on either the needs of the client or the data quality objectives specified for the project. For analytical data generated under this sampling and analysis plan, the reports will contain the following information:

- Client name
- Project number
- Report date
- Analysis method
- Client sample identification
- Laboratory sample ID
- Date of sample collection
- Date of sample receipt
- Date of sample preparation
- Date of sample analysis

- Analyst identification
- Analyte list
- Analytical quantitation limits
- Analytes detected
- Report-specific data flags

All procedures to be used under this sampling and analysis plan are based upon Test Methods for Evaluating Solid Waste, USEPA SW-846, Third Edition and its updates.

Calibration procedures are defined by each method and by the appropriate SOP. These procedures cover thermometers, balances, and all instrumentation that requires calibration. They must meet or exceed the requirements of the specific EPA reference method. Calibration typically includes analysis of a calibration curve, initial and continuing calibration verification, standards reference checks using an independent standard, and blank analyses.

7.3. PEER REVIEW, DATA REVIEW AND VALIDATION

Frequent and periodic reviews of the work will be planned and conducted by EDG during the field and laboratory data collection. EDG will also recommend QA improvements, as deemed necessary, and will inform KDHE and USEPA of these actions. Informal reviews may be conducted as each step of the work proceeds, so that identified issues of concern are raised as soon as possible. In the event that an issue arises which can compromise the successful completion of any current work task, then an immediate formal review will be conducted to resolve the concerns.

After the field work is complete and the analytical data has been received from the laboratory, a systematic data review and validation process will be conducted. This process will consist of:

- Review of field notes;
- Review of data set to ensure that project personnel followed the specifications laid out in this Work Plan;
- Review of QC samples to establish extent (if any) of field induced bias in the analytical data;
- Review of QC samples to establish accuracy and precision;
- Comparison of control limits specified in the analytical methods and guidance documents used for data generation, with measured ranges of accuracy and precision for the data;
- Comparison of holding times, method detection limits, analytical results and action levels to target exceedances;
- Sampling procedures, particularly any variations from the work plan;

- Sample containers and preservation methods;
- Chain-of-custody procedures and documentation;

The data validation process will consider the precision, accuracy, representativeness, comparability, and completeness of the data set, as discussed in the previous sections.

7.4. FINDINGS AND RESOLUTIONS

The need for modifications to the data collection or evaluation process will be identified through the implementation of the project QA/QC procedures, periodic reviews of the work as it progresses, and data review and validation. The type of modification needed will depend upon the amount and type of affected data, and whether the quality of the data and project objectives may have been compromised.

Procedures which do not conform to the QA/QC plan will be evaluated by the responsible project personnel. After review of the non-conformance, modifications and/or resolutions will be developed and proposed. Any changes to the approach will be identified and documented, along with the technical justification. Completion of the resolution to the identified problem will be verified by the project manager and monitored at periodic intervals.

8. REFERENCES

Department of Health and Environment Bureau of Environmental Remediation, Preliminary Findings - Contamination at 29th and Mead, Wichita, Kansas, February 18, 1987.

PRC, Draft Preliminary Assessment Report (RFA), September 24, 1990.

HWS Technologies, Groundwater Sampling and Analysis Report, September 24, 1990.

HWS Technologies, Transmittal letter for a report regarding aquifer testing and report excerpts, December, 20, 1991.

Groundwater Technology, Inc., Draft Remedial Investigation Report for the 29th and Mead RI/FS, August 27, 1991.

Kansas Department of Health and Environment, Expanded Site Inspection, 13th and Washington, Wichita, Kansas, September 1993.

PRC Environmental Management , Inc., on behalf of the USEPA, RCRA Facility Assessment, September 24, 1990.

Corrective Action Permit (Part II), USEPA, December 23, 1994

Corrective Action Permit (Part I), State of Kansas, March 29, 1995

USEPA's Guidance Document, Interim Final RCRA Facility Investigation Guidance, Volumes I-IV May 1989.



REC'D

OCT 15 1999

RCAP

October 14, 1999

Mr. William F. Lowe
Unit Leader
RCRA Corrective Action and Permits Branch
Air, RCRA and Toxics Division
USEPA Region VII—ARTD/RCAP
901 N. 5th Street
Kansas City, KS 66101

RE: Safety-Kleen (Wichita) Facility
Wichita, Kansas
EPA ID# KSD007246846

Dear Mr. Lowe:

Enclosed please find page revisions made to the RCRA Facility Investigation Work Plan for the above-referenced facility. These revisions were made in response to your letter of comments dated July 2, 1999, and conversations with you and Ms. Chris Jump of Kansas Department of Health and Environment (KDHE). We have responded to each of your comments below and made the appropriate changes to the text, figures, tables, and appendices, as needed. The main body of the revised work plan text is provided in its entirety for ease of replacement. The italicized text below presents USEPA's and KDHE's comments, and our responses are presented (unitalicized) below.

- ✓1. ***Section 5.3.4. Soil Sample Collection:** The most immediate risk for human contact with contamination is in the near surface soils in unpaved areas. Safety-Kleen (SK) must collect shallow (0 to 4") soil samples from borings in unpaved areas.*

This change has been made and is reflected in Section 5.3.4, and Table 4.

- ✓2. ***SK** should include a figure in the RFIWP depicting the areas of the facility that are not covered by structures or paving.*

This change has been made to Figures 2, 3 and 5.



3. **Section 5.3.4 Soil Sample Collection:** *The EPA will require soil samples collected near the top of the saturated zone at locations where shallower samples show contaminants at elevated levels. SK can either perform head space analysis on splits from the shallow samples and decide whether to collect deeper samples while the equipment is mobilized for this phase of the investigation or defer deeper sampling until after the Phase I laboratory analytical data is available. The RFIWP must have an acknowledgment that deeper samples will be required in areas where shallow contamination exists.*

The soil sampling approach, as presented in Section 5.3.4, has been modified and includes the use of headspace measurements to assess soil conditions in the field. These data will be used to assess whether deeper borings are needed in a given area to assess the vertical extent of VOC impacts. Samples with the highest headspace measurement will be selected for laboratory analysis, as described in this section of the Work Plan. However, we have purposely avoided collection of soil samples just above the water table, since concentrations at this depth may result from dissolved or free phases of a given constituent related to the ground water, and not adsorbed concentrations.

4. **Section 5.4, Groundwater Data Collection:** *SK must add a third bullet as follows: To identify data gaps, for resolution in future investigation phases, to complete the horizontal and vertical definition of any contaminant plumes, originating from facility releases, both on and off the facility, this must be stated in the RFIWP.*

This change has been made to Section 5.4, as requested.

5. **Section 5.4.4 (now 5.4.5), Analytical Testing of Groundwater Samples:** *The groundwater plume must be defined horizontally and vertically to levels below MCL's.*

As discussed in our recent conference call, potential ground water plume(s) will be assessed to concentrations to be agreed upon at a later stage in this RFI process, after initial site data have been collected and evaluated. These concentrations will be presented to USEPA and KDHE for approval prior to completion of the RFI work. The method detection limits will be at or below the maximum contaminant levels (MCLs) for constituents of concern, to the extent possible.

6. **Section 5.4.4, Analytical Testing of Groundwater Samples:** *The EPA suggests that SK review the analytes recommended in the EPA document Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater (EPA/600/R-98/1128.) This will help ensure that SK collects the appropriate samples and performs the proper analysis to evaluate the potential for natural attenuation.*

We acknowledge this, and believe that for the purposes of this RFI, the analytes selected will allow for an initial evaluation of the future potential use of natural attenuation at the site.

7. **Section 6.2. Data Presentation:** *SK must include a table listing the "Preliminary Remediation Goals" (PRGs) for each target analyte.*

The text has been modified to reflect that this information will be presented in the RFI report, as requested.

8. **Section 6.2. Data Presentation:** *The Phase I RFI Report must identify any data gaps that will require subsequent investigations, including off site investigations that may be necessary to complete the definition of the horizontal and vertical extent of contamination as required in the Facility Permit, Part II, Section VII. 4. C.*

The Phase I RFI Report will identify any data gaps identified during the investigation, as reflected in Section 6.2.

9. **Section 6.4. Proposed Stage 1 Action Levels:** *See Comment 4 above. The EPA and KDHE have not agreed that "industrial land use PRGs" are appropriate. Depending on the definition of these PRGs, they may or may not be determined protective. Since this determination will be made later in the corrective action process, SK should define the extent of soil contamination to levels that are protective of groundwater. For many constituents, these levels are tabulated in the April 19, 1996 EPA Region III Risk Based Concentration Table. If SK does not have a copy of the Region III table, the EPA will furnish a copy.*

Refer to our responses to Comments 5 and 7 above. We have modified the text of Section 6.4 to indicate that the screening levels will be selected and agreed upon with USEPA and KDHE after the first stage of the Phase I RFI. The screening levels will be presented in the addendum to this Work Plan, which will be generated upon completion of the first stage of field work.

10. **Section 6.5, Health and Environmental Assessment:** *SK should explain in the RFIWP that the HEA will follow the guidance provided in the document Risk Assessment Guidance for Superfund Parts A through D.*

This change has been made in Section 6.5.

KDHE reviewed this document with regards to KDHE's source control measures scope of work and evaluated the ability of the proposed investigation to determine if the Safety-Kleen facility is or was a contributing source of contamination to the ground water in the NIC site. KDHE provides the following comments:

1. *Section 3.3.2. Aerial Photographs, Pages 6-7: KDHE notes that an air photo circa 1980 was not utilized in this evaluation. KDHE also notes that there was a significant level of activity and changes occurring at the site during the late 1970's to mid 1980's, and that a number of environmental violations were documented by the EPA and KDHE Bureau of Waste Management during this time. KDHE notes that a photo from this time period might help pinpoint potential problem areas and, in particular, might help locate two potential source areas identified in documentation dated April 1978 and December 1980, respectively:*
 - 1) *the hand dug trench diverting waste solvent and still bottom sludge under the facility fence to the drainage channel, and*
 - 2) *the propane tank cut in half and utilized as a settling tank/sludge separator in the southwest corner of the site. No sampling has been proposed to locate and characterize these potential source areas. KDHE requests that the locations of these activities be determined to the extent possible and presented in the investigation report. Appropriate samples should be collected from these areas either as part of this investigation or a subsequent investigation. KDHE suggests that the sampling include sediment samples from the drainage channel north of the facility.*

EDG has obtained and reviewed an aerial photograph from 1983. The additional photo and associated graphical interpretation are enclosed to be added to Appendix C, and are discussed in Section 3.3.2. Borings B-40, B-41 and B-42 have been added to the scope of work to address activity in the northeastern corner of the site observed in this photograph. The aerial photo did not help in locating the propane tank or the hand dug trench mentioned above. However, KDHE has provided us with color photographs of this trench from their files. This page of photographs is enclosed for addition to Appendix D, which presents a summary of information found in KDHE files. The location of boring B-39 will be modified in the field using these photographs and feedback from site personnel, to a location believed to be in the vicinity of the former still bottoms trench.

2. *Section 5.3.2. Sampling Locations and Selected Analytes, Page 20: The second to last paragraph in this section indicates that the disturbed areas in the northeastern most corner of the site (northeast of Building K) are reportedly associated with non-hazardous household debris, and no sampling was proposed in this area. KDHE files indicate that waste solvent tanks, accessed by trucks, were located in this extreme northeast corner of the site. Acid tanks may also have been located in this area. Soil gas samples collected in this general area in 1992 indicated the presence of various chlorinated solvents. KDHE requests that sampling be conducted in the north east portion of the facility.*

As discussed in our conversations with KDHE, borings B-40 through B-42 have been added to address impacts in the northeastern-most corner of the site. (See the response to KDHE's Comment 1 above.)

3. **Section 5.3.4. Sampling Intervals and Selection, Page 21:**

- A. *It is not clear to KDHE how the sampling depths stated on Table 4 for B-4, B-25, and B-26 were determined. KDHE notes that due to the former activities in the vicinity of B-24 and B-25, both shallow and deep soil samples may be appropriate. KDHE recommends determining sample depths in the field based on head-space screening, soil staining, or other applicable indicators.*

This modification to the sampling approach has been made and is reflected in the soil sampling approach presented in Section 5.2.4, and in Table 4.

- B. *KDHE requests that sampling location B-35 also be advanced to a depth greater than three feet due to the potential that the former lagoon area may have been backfilled to bring the area up to grade. Sample depth should be determined in the field based on appropriate indicators.*

This modification has been made and is reflected in Table 4 of the Work Plan.

- C. *The Workplan must include a SOP or description for collecting soil head-space measurements.*

SOP # 30-A is enclosed and should be added to Appendix G, along with the other SOPs.

4. **Section 5.4.1. Monitoring Well Installation and Development - Page 22:**

KDHE agrees that the proposed wells should be sufficient for assessing the ground water gradient and flow direction across the site. However, KDHE is concerned that ground water quality, both on site and upgradient, cannot be fully assessed without well pairs that evaluate both shallow and deep water at the same location, and without water samples from the vicinity of potential source areas. Work in the Wichita area has shown that the groundwater contamination often exhibits a significant vertical stratification within the alluvial aquifer. There are many variables that affect this stratification, such as: specific gravity of the compound, age of the release, distance from source area, differential permeability in the aquifer, or differential degradation rates. A good understanding of the vertical stratification of contamination at the facility will be necessary for adequate interpretation of the data since this site has many complicating factors. These factors include: the long history of chemical handling and the potential for multiple releases over a long time frame; petroleum contamination

upgradient and down gradient which may increase degradation rates in the shallow zone of the aquifer; and potential chlorinated solvent impact from upgradient sources. Due to the history of the site, documented poor handling practices in the past, and the nature of the alluvial sediments as discussed in the comment letter dated September 28, 1999, soil sampling based primarily on identified SWMUs, AOCs, and limited aerial photos, may miss potential source areas. Therefore, the currently proposed level of groundwater sampling will not fully satisfy KDHE's requirements for ground water characterization, even if little or no soil contamination is identified.

KDHE strongly recommends collecting shallow and deep groundwater samples with the geoprobe from some of the proposed soil boring locations. The following locations are suggested for evaluating potential source areas and ground water quality across the site: B-8, B-20, B-22, B-24, B-31, B-35, EB-1, EB-2, EB5, and several upgradient locations. This list of potential ground water sampling locations is not intended to be definitive. KDHE acknowledges that this work could also be performed in a subsequent phase of work after collecting ground water gradient data from the proposed wells.

S-K has modified the Work Plan to include the collection of ground water samples with the Geoprobe® in at least eight locations across the site. At each sampling location, a total of three ground water samples will be collected at various depths in the shallow water-bearing zone to assess the vertical distribution of contaminants in a given location. Five of these sampling points will be conducted in the exploratory borings, where monitoring wells will eventually be installed. Three additional locations will be selected in the field based upon PID measurements and field observations. This information will be utilized along with the initial data collected from the existing and currently proposed monitoring wells to assess the locations, depths and well construction of future site monitoring wells.

5. **Section 5.4.1. Monitoring Well Installation and Development, Page 23:** *No criteria is provided in the text or in SOP #6-B for determining when a well has been sufficiently developed. KDHE policy typically requires development to continue until field parameter measurements have stabilized to within 10% for three consecutive measurements, fines have been removed from or significantly reduced in the ground water.*

A more recent SOP #6-B is being submitted with this revision that states the criteria to determine whether a well is sufficiently developed. It will replace the former SOP #6-B that was submitted with the last Work Plan.

6. **Section 7.1.8. Field Oc Samples, Page 34:** *Safety-Kleen must analyze rinseate samples for VOCs as well as SVOCs and inorganic parameters.*

This modification has been made to the plan.

7. ***General:** KDHE has diagrams or photos showing tanks and tanks or truck trailers located both east and west of the fence running north from the northeast corner of building I. Samples have not been proposed in this immediate area but, depending on sampling results, may be requested in the future.*

Three additional soil sampling locations have been proposed in this area (B-40 through B-42) to meet this concern.


Please replace the modified text, Figures (2-5), and Table 4 from your last bound copy of the Work Plan (dated February 1999) with those enclosed with this letter. The copy of the aerial photograph and the interpretation of this aerial photo should be added to Appendix C. Also, please replace the old SOP #6B in Appendix G with the more recent one enclosed, and add SOP # 30A to this appendix. The page of color photos enclosed should be added to Appendix D. We appreciate your cooperation and assistance in this matter.


At this time we have tentatively scheduled the initial field work at the facility for the week of November 29th. We will alert you and Ms. Jump if this schedule is modified.

For future reference, the consulting division of Safety-Kleen has changed its name from Environmental Decision Group (EDG) to Safety-Kleen Consulting. This change is effective immediately. Because the enclosed documents are being inserted into a binder with our previous name, I have used EDG in these enclosures for consistency. However, in the future, all correspondence from the consulting division will reflect the Safety-Kleen name and logo.

If you have any questions on the revisions or inserts enclosed, please call me at 303.938.5535. We look forward to working with you on this project.

Sincerely,


Kay L. Tauscher, CPG
Project Manager


Carol O. Edson
Senior Engineer

Enclosures

Cc: Chris Jump - KDHE
Geoff Jones - S-K
Ron Robertson - S-K

TABLES

Table 1
List of SWMUs/AOCs
Safety Kleen (Wichita), Inc. Facility

SWMUs:

1. Process area storage tanks
2. Waste Blending and Drum Processing area *
3. Former Drum Processing Area* +
4. Process Area Truck Bay
5. Sparging Area
6. Hot Room
7. Elevated Tank Storage Area
8. Regulated Waste Storage Area°
9. Solids Dryer +
10. Drum Crusher*
11. Crushed Drum Roll-off boxes *
12. Warm Room
13. Dock Area*
14. Drum Storage Warehouse (Bldg. C)*
15. Building J +
16. Corrosive Waste Storage Area
17. Dry Solids Gondola
18. Open Area Along the SW corner
19. Open Area North of Bldg. I +
20. Paint Can Burial Pit#
21. Cyclone#
22. Old Still Area West of Bldg. I#
23. Area East of Bldg. I#
24. Area South of Bldg. C#

AOCs:

1. Laboratory Sample Storage Area
2. Former Above Ground Fuel Tanks
3. Building I
4. Concrete Vault

Notes:

*According to the Part II Permit, the asterisked SWMUs indicate that recent improvements to these SWMUs will minimize the potential for further releases in areas of historical releases, and that contamination present may not spread significantly. In recognition of the disruption to operations that would be caused by corrective actions in these areas, and because a delay will not threaten human health or the environment, the permittee may delay corrective action to these subsoils until such time that the structure in question is removed, or until final closure of the facility, whichever comes first.

#SWMUs added since the RFA was prepared. Identified in the Part II Permit.

° Listed as "non-regulated" in the Part II permit; however, this is a regulated waste storage area according to site personnel.

*Listed as an AOC in the draft RFA; however, classified as a SWMU in Part II permit.

Table 2
History for Safety-Kleen (SK) Wichita Facility
Formerly Laidlaw Environmental Services (LES) Wichita Facility

- | | |
|-------------------|--|
| 1940's until 1979 | <ul style="list-style-type: none"> • Site was occupied and used by Enmar Paint Co. |
| June 1979 | <ul style="list-style-type: none"> • Hazardous waste operations initiated by Reid Supply Co. (RSC) involved management of spent solvents, spent electroplating baths, and sludges generated off-site as a service to its customers. • Materials handling and waste processing were conducted on two parcels of land, which comprised the RSC facility. The southwestern portion of site was referred to as the South Plant and the northeastern portion was referred to as the North Plant; these two parcels are separated by a road labeled on site maps as 25th Street. • Bulk storage and solvents reclamation through settling and distillation occurred on site (North Plant), and blending into fuel supplement for off-site energy recovery (South Plant), or shipment of waste to another RCRA facility for treatment or disposal. Hazardous waste operations reportedly ceased at the North Plant in 1985. |
| October 1986 | <ul style="list-style-type: none"> • RSC sold operations at the North Plant to Service Chemical Supply Company (SCSC). These operations involved acid repackaging and the distribution of industrial chemicals. • RSC retained the title to the property and leased it to SCSC during their operation. |
| 1988 - Present | <ul style="list-style-type: none"> • Hydrocarbons Recyclers, Inc., (a subsidiary of USPCI), purchased the site from Reid Supply Company (RSC) in 1988. • In January 1990, SCSC moved their operations completely off site. • USPCI was purchased by Laidlaw Environmental Services, Inc. (LES) in 1995, thereby acquiring the site. • LES purchased Safety-Kleen Corp. (SK) in 1998 and changed the name of the facility to Safety-Kleen (Wichita) Facility. The facility currently manages RCRA regulated waste for handling and processing. • During these years, the site has operated as a hazardous and non-hazardous waste handler and processor for off-site generators of chlorinated and nonchlorinated solvents, paint and lacquer wastes, waste oils, greases, waxes, flammable and corrosive wastes, and spent dry cleaning wastes. |

Table 3
Phase I RFI SWMU/AOC Description and Background
Wichita, Safety-Kleen Facility

SWMU/AOC Identification	Description, Historical Significance and/or Current Usage
1. Process Area Storage Tanks	The storage tanks were installed in June of 1988. There are eight (8) above ground storage tanks constructed of carbon steel and located in a diked portion of the processing area. Five (5) of the tanks are 7000 gallon capacity, and used to offload the waste into transporter tanker trucks. There are two (2) 21,000 gallon capacity tanks used for storage of blendable wastes, and a 7000 gallon capacity tank for non-chlorinated solvents. A 500 gallon tank is also used for storage of gasoline for use as fuel. It is noted in the RFA that no historical releases have been documented and potential for future releases is believed to be low.
4. Process Area Truck Bay	The truck bay is primarily used for onloading wastes to transport tanker trucks. Wastes are pumped into the trucks from the above ground storage tanks that lie to the north of the truck bay. The bay is ramped to the west, and equipped with a centrally located blind trench sump. The bay is constructed with bermed curbs and a protective guardrail along the southern berm. No releases are known to have occurred from this area. According to the RFA, the potential for release from this SWMU is low.
5. Sparging Area	Three steam-heated spargers were formerly used for stripping PCE from dry cleaning canisters and filters. Located in southwest corner of Building D. This process was initiated between 1984 and 1986, but is no longer in operation at the current facility. The sparging area had a central sump. No historical releases are known to have occurred in this area. The potential for release from this area, according to the RFA, was low.
6. Hot Room	Two small enclosed rooms that were kept at temperatures of up to 190 degrees and were used to lower the viscosity of certain wastes such as waxes and greases prior to waste blending. Located on north wall of Sparging area (see above), this room is approximately 25x10x8 feet. No floor drains are present in this room. This room is currently in use. The wastes placed in this room were typically waxes and greases. No historic releases are known to have occurred in this area. The potential for release from this SWMU is low, according to the RFA.

Note:

- SWMU Numbers 2,3,10,11,13, and 14 which are not included in this table will be addressed in the RFI Phase II Workplan.
- This table only includes those SWMUs/AOCs that need to be addressed in the Phase I RFI work plan, per the Part II permit.

Table 3 continued

7. Elevated Tank Storage Area	These tanks are used for storage of hazardous and non-hazardous waste. They are located in the northwest corner of Building D approximately 15 feet above the floor level. The tanks vary from 2000 to 9000 gallon capacity, are made of carbon steel, and are used to onload and offload wastes associated with processing and/or transporting. They contain recycled PCE, chlorinated solvents waste water, oils, diesel fuel and nonhazardous waste oil. This area is equipped with containment controls and a collection sump. No historic releases have been known to occur in this area. The potential for release from this area, according to the RFA is low, due to the age and condition of the tanks, as well as the physical barriers to any releases that might occur.
8. Regulated Waste Storage Area	The area in the north central and northeastern part of Building D is permitted as a regulated hazardous waste storage area, although the RFA describes it as a non-regulated storage area. Because there is no sprinkler system in this area, no flammable or reactive wastes are stored here. This area is diked to meet the requirements for storage of hazardous waste in containers. No releases have been reported from this area, although stained concrete was noted in the RFA in the Northcentral portion of the area. Because there was not secondary containment in this area at the time of the RFA, the potential for release to occur from this area was considered moderate.
9. Solids Dryer	This unit was formerly located in the southeastern corner of Building D. It was used to recover solvents from shredded dry cleaning filters. No releases were reported from this unit during its operation.
12. Warming Room	This SWMU was in a former site building (Building F) located to the east of the northeast corner of Building C, almost against the northern site fence-line. The building was approximately 30 feet long, and the eastern two-thirds of the building housed the former warming room. (An office was located in the western third of the building.) It was used during the winter months to thaw iced drums prior to waste processing. No historic releases reported from this area. According to the RFA, the potential for waste release from the thawed drums in liquid form was low based on physical barriers, and the potential for release in vapor form was moderate. A formal closure with soil sampling was previously conducted on this SWMU.

Note:

- SWMU Numbers 2,3,10,11,13, and 14 which are not included in this table will be addressed in the RFI Phase II Workplan.
- This table only includes those SWMUs/AOCs that need to be addressed in the Phase I RFI work plan, per the Part II permit.

Table 3 continued

15. Building J	Building J is a relatively large warehouse east of the facility on what was previously operated as the RSC North Plant and subsequently by the Service Chemical Supply Company. It was historically used for drum storage of virgin flammable and chlorinated solvents, chemical product distribution, as well as office space. It was also used by USPCI for storage of household wastes, which were primarily paint wastes. It is currently used by Safety-Kleen for laboratory pack/repack operations. The building is elevated at dock level above the ground surface. No releases have been reported from this area of the facility. The potential for release from this area is reported to be moderate in the RFA due to the lack of secondary containment around historical drum storage areas and the like.
16. Corrosive Waste Storage	Corrosive wastes are stored in Building B, located in the south-central part of the facility. It is divided into four container management units. The materials stored here include corrosive and non-ignitable hazardous wastes destined for off-site management, recycling as waste fuel, wastewater management, and solvent recovery or off-site transport for additional management. The storage capacity for the entire Building is 55,000 gallons.
17. Dry Solids Gondola	A gondola (i.e., a closed-top roll-off box) owned by USPCI was located south of Building C and was reportedly formerly used for temporary storage of dry solids. At the time of the site visit for the RFA, it was storing metals-impacted soil intended for landfill disposal. Wastes held in the gondola for subsequent landfill disposal included soil and debris impacted with metals, nonflammable dry paint solids containing no F-listed wastes, and non-blendable solids exhibiting some hazardous waste characteristics. No releases have been reported in this area, and the potential for release in this area was considered moderate in the RFA.
18. Open Area along Southwestern Corner of Site	This portion of the site has not historically been used for waste handling or processing. During a USEPA inspection in April 1984, the area along the western facility border was being used for empty drum storage. At that time, drummed waste was also observed to be staged south of the drum storage warehouse, in an area east of the dry gondola area. A mound of tires was also observed in this area during the 1984 USEPA inspection. In June of 1988, during a KDHE inspection, an out-of-service distillation unit was observed in this area. This area is currently a wide-open, undeveloped space on site. This area has no known reported releases. In the RFA, this area was reported to have a moderate potential for release.

Note:

- SWMU Numbers 2,3,10,11,13, and 14 which are not included in this table will be addressed in the RFI Phase II Workplan.
- This table only includes those SWMUs/AOCs that need to be addressed in the Phase I RFI work plan, per the Part II permit.

Table 3 continued

19. Open Area North of Bldg. I	This area was used for bulk storage of virgin solvents, storage of sulfuric and nitric acid in above ground tanks (north and east of Building I) and storage of drummed wastes. Drums were previously stored north of this building that contained paint wastes, waste thinner, radioactive wastes and liquid caustic. Virgin nonchlorinated solvents were stored in aboveground tanks in this area. Sulfuric and nitric acid were reported to be stored in elevated tanks behind Building I. Surface staining was observed along the fenceline northeast of this building during the 1984 USEPA inspection of the site. Two observation wells still exist in this area. The potential for release in this area to have occurred is reported as high in the RFA, due to the potential for surface water runoff to the drainageway north of the area.
20. Former Paint Can Burial Pit	Buried paint cans and paint related wastes were discovered in 1992 in an area approximately 20 ft ² in size. Burial predated Reid's purchase of the property. The historical use of this SWMU is uncertain; this property was used for paint manufacturing from the mid 1940s until 1979. S-K has not been involved with this generation of this SWMU, nor has it buried waste anywhere on the facility. This is located approximately 20 feet west of the southwestern corner of Building B. No releases have been identified from this SWMU. The area was excavated and residual soil samples were clean.
21. Cyclone	This piece of machinery is located within the south-central part of Building D, along the west wall of the shredder/granulator room. It was previously used to recover solid material from the shredder/granulator. It is located within well-maintained secondary containment. Potential for release from this unit is expected to have been low, since the machinery sits above grade within a building, underlain by concrete. No visible cracks or drains were observed near the cyclone.
22. Old Still Area West of Bldg. I	This area was historically used in the distillation process for solvents that was formerly conducted in this portion of the facility. The area is covered by concrete, just outside of the southwest corner of building I.
23. Area East of Bldg. I	This area may have historically been used for drummed storage. Gravel is located where a former building used to sit. The area is defined on Attachment C of the permit. It is shown as the entire open space east of Building I and north of building J.
24. Area South of Building C	This area is open, undeveloped space on site.

Note:

- SWMU Numbers 2,3,10,11,13, and 14 which are not included in this table will be addressed in the RFI Phase II Workplan.
- This table only includes those SWMUs/AOCs that need to be addressed in the Phase I RFI work plan, per the Part II permit.

Table 3 continued

SWMU/AOC Identification	Description, Historical Significance and/or Current Usage
1. Laboratory Sample Storage ^a	This storage area is maintained in Building A for samples from serviced clients awaiting analysis. It is a small closet-like room located on the south side of the building. There have been no known releases reported in this area. The potential for release from this area is reported as low, according to the RFA.
2. Former Above Ground Fuel Tanks Location ^a	Two former elevated 500-gallon tanks used for fueling were located in the southwestern portion of the facility, west of Building B. One was used for unleaded gasoline and the other for diesel fuel. The tanks sat on steel frame supports. The area underlying the tanks was covered with gravel. No reported releases have occurred from this area, although overrun and spillage is common in fueling areas such as this. The potential for release from this area, according to the RFA, was moderate.
3. Building I ^a	This building was historically used for solvent distillation processing and acid repackaging. Chlorinated and nonchlorinated solvents were handled in this area and the virgin acids handled included sulfuric, nitric and hydrochloric. No known releases have been reported in this area. The potential for release in this area according to the RFA is low.
4. Concrete Vault ^a	A concrete vault, located in the northeastern portion of the facility, northwest of building I, served as a discharge basin for cooling water during the solvent distillation process. Wastes previously used in the area of the concrete vault include chlorinated and non-chlorinated solvents. No history of release is known for this area, and the vault is no longer in use. The vault appears to currently be filled with gravel at the ground surface. According to the RFA, this area is believed to have had a high potential for release.

Note:

- SWMU Numbers 2,3,10,11,13, and 14 which are not included in this table will be addressed in the RFI Phase II Workplan.
- This table only includes those SWMUs/AOCs that need to be addressed in the Phase I RFI work plan, per the Part II permit.

^a This is an AOC identified.

Sources: RCRA Permit Application, Section L and Draft Preliminary Assessment Report, September 24, 1990.

Table 4
Proposed Soil Sampling Information
S-K Facility, Wichita, Kansas

Sampling Point ID	Sampling Depth	Analytical Parameters	SWMU/AOC ID	Sampling Type
B-1	0-4 in.	Inorganics, pH, SVOCs, Pest., VOCs	Laboratory Sample Storage	Biased
B-2	0-4 in.	Inorganics, pH, VOCs	Corrosive Waste Storage	Biased
B-3	1-3 ft.	Inorganics, pH, VOCs	Corrosive Waste Storage	Biased
B-4	Below backfill (Field judgement)	Inorganics, pH, VOCs	Paint Can Burial Pit	Biased
B-5	0-4 in.	Inorganics, pH, PNAs, TPH, BTEX	Former Above Ground Fuel Tanks	Biased Biased
B-6	0-4 in.	Inorganics, pH, SVOCs, VOCs	Southwestern Corner of Site	100' Spacing Grid
B-7	0-4 in.	Inorganics, pH, SVOCs, VOCs	Southwestern Corner of Site	100' Spacing Grid
B-8	0-4 in.	Inorganics, pH, SVOCs, VOCs	Southwestern Corner of Site	100' Spacing Grid
B-9	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, SVOCs, VOCs	Southwestern Corner of Site	100' Spacing Grid
B-10	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, SVOCs, VOCs	Southwestern Corner of Site & Dry Solids Gondola	100' Spacing Grid
B-11	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, SVOCs, VOCs	Southwestern Corner of Site	100' Spacing Grid
B-12	1-3 ft. (in gravel area)	Inorganics, pH, Pesticides, VOCs	South of Building C	Biased
B-13	1-3 ft. (in gravel area)	Inorganics, pH, Pesticides, VOCs	South of Building C	Biased
B-14	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, VOCs	North of Bldg. C along RR tracks	Biased
B-15	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, VOCs	North of Bldg. C along RR tracks	Biased
B-16	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, SVOCs, VOCs	N of Processing Area along RR tracks	Biased
B-17	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, SVOCs, VOCs	North of Building D along RR tracks	Biased
B-18	1-3 ft.	Inorganics, pH, SVOCs, VOCs	Former Warming Room Area	Biased
B-19	1-3 ft.	Inorganics, pH, SVOCs, VOCs	Processing Area Storage Tanks & Process Area Truck Bay	Biased
B-20	1-3 ft.	Inorganics, pH, SVOCs, VOCs	Processing Area Truck Bay & Hot Rooms & Sparging Area	Biased
B-21	1-3 ft.	Inorganics, pH, SVOCs, VOCs	Processing Area Storage Tanks & Elevated Tank Storage Area	Biased
B-22	1-3 ft.	Inorganics, pH, VOCs	Former Solids Dryer, Cyclone, Hot Rooms, Sparging Area	Biased
B-23	1-3 ft.	Inorganics, pH, VOCs	Regulated Waste Storage Area	Biased
B-24	0-4 in. if in grass (1-3 ft. if in pavement)	Inorganics, pH, VOCs	Former Old Still Area	Biased
B-25	Field Judgement 8-10 ft (if no PID rdgs.)	Inorganics, pH, VOCs	Concrete Vault & Area North of Bldg. I	Biased
B-26	Field Judgement 8-10 ft (if no PID rdgs.)	Inorganics, pH, VOCs	Concrete Vault	Biased
B-27	0-4 in.	Inorganics, pH, VOCs	Area North of Bldg. I & former ASTs	Biased
B-28	0-4 in.	Inorganics, pH, VOCs	Area along stream/Area north of Bldg. I	Biased

Sampling Point ID	Sampling Depth	Analytical Parameters	SWMU/AOC ID	Sampling Type
B-29	0-4 in.	Inorganics, pH, VOCs	Area East of Bldg. I	Biased
B-30	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, VOCs, pesticides	Area East of Bldg. I/North of Bldg. J along RR tracks	Biased
B-31	0-4 in. (1-3 ft. if in gravel)	Inorganics, pH, VOCs	Area Southeast of Bldg. I/North of Bldg. J	Biased
B-32	1-3 ft.	Inorganics, pH, VOCs, pesticides	Area adjacent to Building J	Biased
B-33	1-3 ft.	Inorganics, pH, VOCs, pesticides	Area adjacent to Building J	Biased
B-34	1-3 ft.	Inorganics, pH, VOCs, pesticides	Area adjacent to Building J	Biased
B-35	Below backfill (Field judgement)	Inorganics, pH, SVOCs, VOCs	Lagoon Area from 1960 and 1970 Aerial Photos	Biased
B-36	1-3 ft.	Inorganics, pH, VOCs, TPH	ASTs in central portion of site, based upon historical aerial photo from 1960	Biased
B-37	1-3 ft.	Inorganics, pH, VOCs, TPH	Adjacent to unknown structures (possibly ASTs) in aerial photo 1970	Biased
B-38	1-3 ft.	Inorganics, pH, VOCs, TPH	In former drum storage area, east of Bldg. A, from 1960 aerial photo	Biased
B-39	0-4 in.	Inorganics, pH, VOCs	To be located in field to assess former trench leading to ditch	Biased
B-40	0-4 in.	Inorganics, pH, VOCs	Sampling to assess activities in NE corner of site, seen in 1983 aerial photo	75 ft. Grid spacing
B-41	0-4 in.	Inorganics, pH, VOCs	Sampling to assess activities in NE corner of site, seen in 1983 aerial photo	75 ft. Grid spacing
B-42	0-4 in.	Inorganics, pH, VOCs	Sampling to assess activities in NE corner of site, seen in 1983 aerial photo	75 ft. Grid spacing

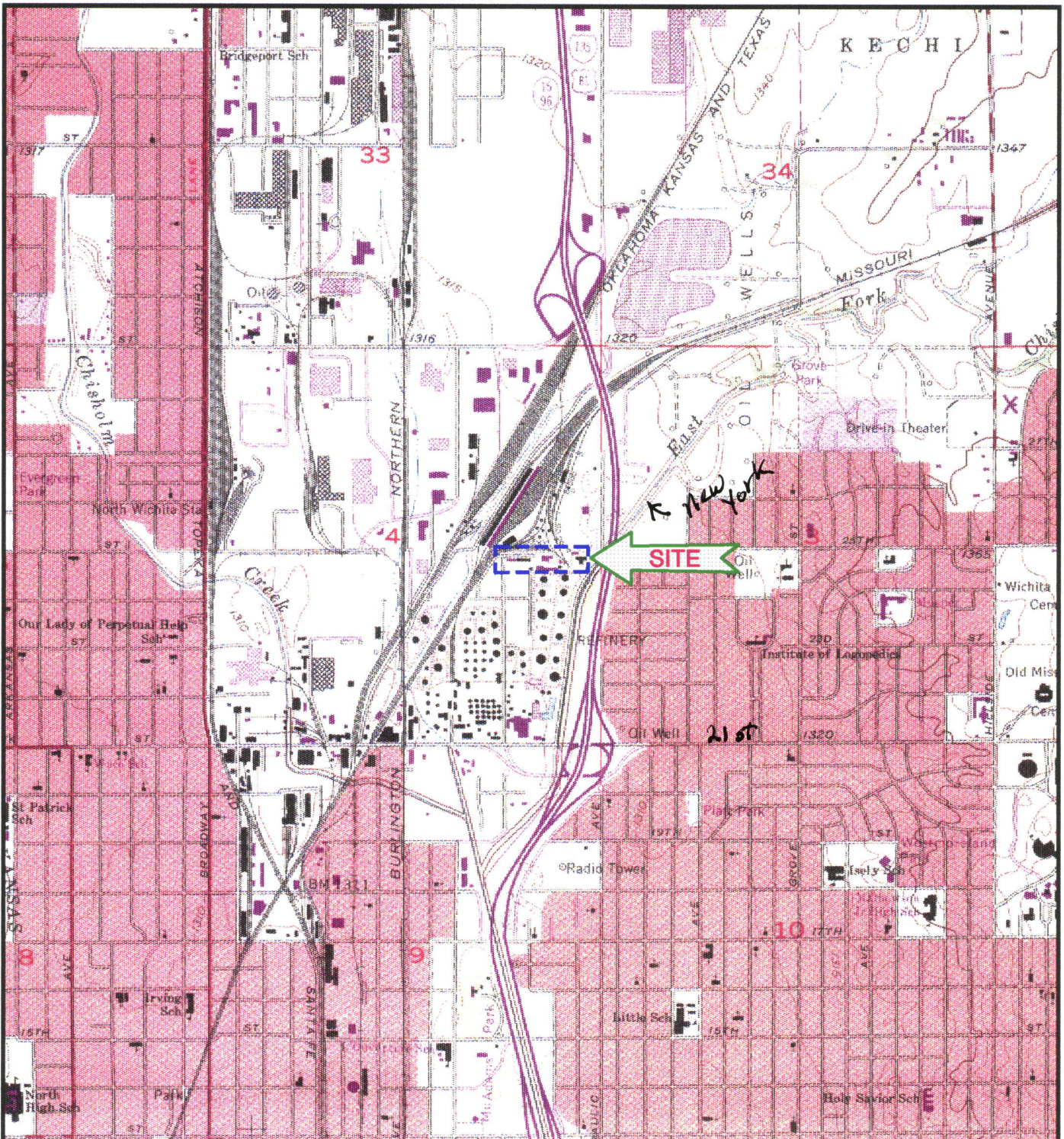
Note: Additional deeper samples may be collected and analyzed for VOCs only based on PID readings collected in the field.

Table 5
Analytical Methods
S-K Wichita Facility

Parameter	Anticipated Method	Matrix	Preferred Container (#) Type	Minimum Amount Required	Preservation & Storage	Holding Time
Volatile Organic Compounds (VOCs)	624	Water	(2) 40 ml VOA Glass	40 ml	pH < 2 w/HCl, 4°C	14 Days
Volatile Organic Compounds (VOCs)	8260A	Soil	(1) 125 mL SJ	10 g	4°C	14 Days
Methane	RSK175 Mod.	Water	(2) 40 ml VOA Glass	40 ml	pH < 2 w/HCl, 4°C	14 Days
Chloride	325.2	Water	(1) 250 mL HDPE	5 mL	none	28 Days
Sulfate	375.4	Water	(1) 250 mL HDPE	100 mL	4°C	28 Days
Alkalinity, Carbonate & Bicarbonate	310.1	Water	(1) 250 mL HDPE	50 mL	4°C	14 Days
Calcium (Total)	6010	Water	(1) 1L HDPE	200 mL	pH < 2w/HNO ₃	6 Months
Magnesium (Total)	6010	Water	(1) 1L HDPE	200 Ml	pH < 2w/HNO ₃	6 Months
Potassium (Total)	6010	Water	(1) 1L HDPE	200 mL	pH < 2w/HNO ₃	6 Months
pH - Corrosivity	1110	Soil	Glass vessel	---	None	None specified
Manganese (Total)	6010	Water	(1) 1L HDPE	200 mL		6 Months
Manganese (Dissolved)	6010	Water	(1) 1L HDPE	200 mL		6 Months
Metals Analysis (other than Hexavalent Chromium and Mercury)	6000 & 7000 Series	Soil	Glass vessel	10 g	pH < 2w/HNO ₃	6 Months
Metals Analysis (other than Hexavalent Chromium and Mercury)	6000 & 7000 Series	Water	(1) L HDPE	200 mL	pH < 2w/HNO ₃	6 Months
TPH	8015 Modified	Soil	---	200 g	pH < 2, w/HCL	None specified
Semivolatiles (SVOCs) - GC/MS	8270C	Soil	Amber Glass vessel	30 g		14 Days (ext.)/ 40 Days (analysis)
Pesticides	8081A	Soil	(1) 250 mL SJ	30 g	4°C	14 Days
SVOC - PNA	8270C	Soil	(1) 250 mL SJ	30 g	4°C	14 Days
Nitrogen, Nitrate and Nitrate	353.2	Water	(1) 250 mL HDPE	10 mL	pH < 2 w/H ₂ SO ₄ , 4°	28 Days
Nitrogen, Ammonia	350.1	Water	(1) 250 mL HDPE	5 mL	pH < 2 w/H ₂ SO ₄ , 4°	28 Days

* Where reference to the most currently promulgated SW-846 methods is made, previous versions may also be inferred.

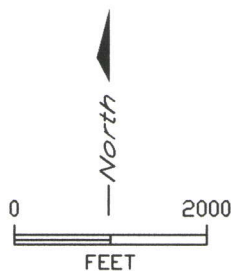
FIGURES



MAP ADAPTED FROM U.S.G.S 7.5' SERIES
QUADRANGLE WICHITA EAST, KANSAS



QUADRANGLE LOCATION




**ENVIRONMENTAL
DECISION GROUP, INC.**
Innovative Services • Advanced Technology
A Safety-Kleen Company

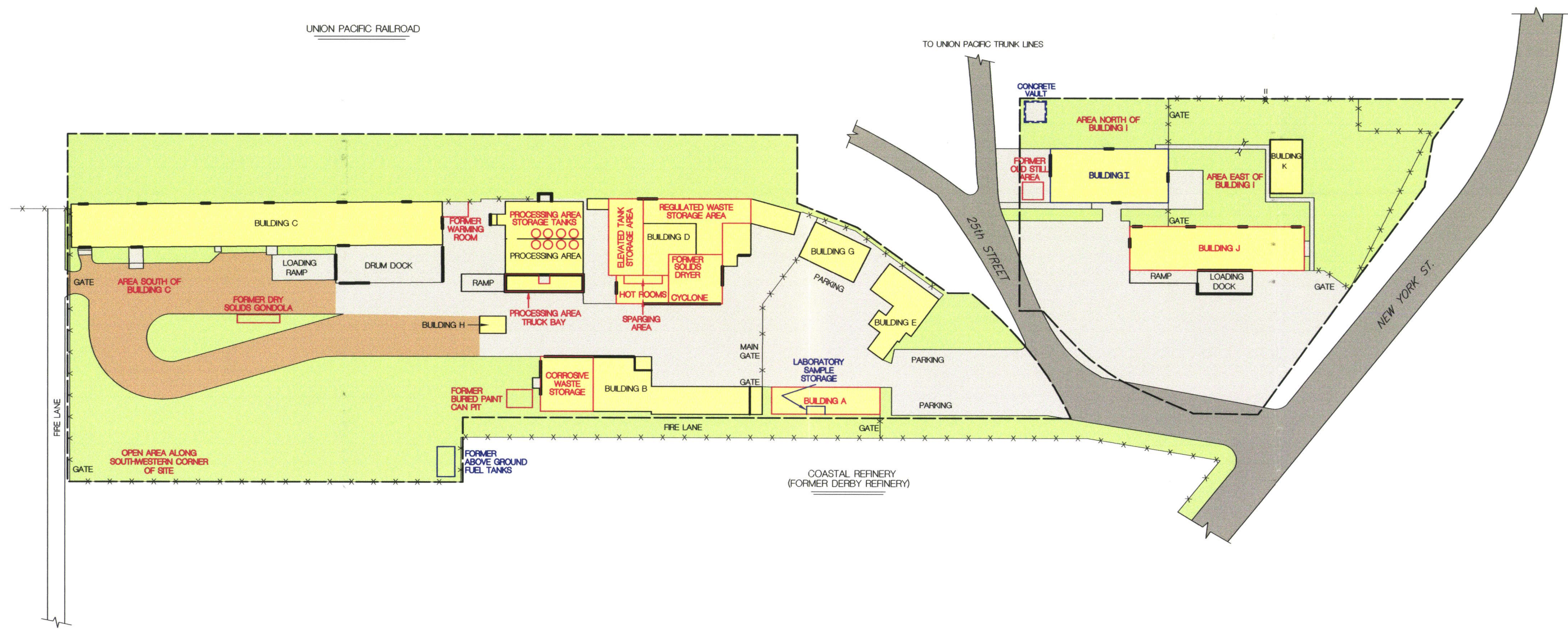
WICHITA, KANSAS

FIGURE 1
SITE LOCATION MAP

SCALE: 1" = 2000'

DATE: 5/26/98

96323-LOC.MAP

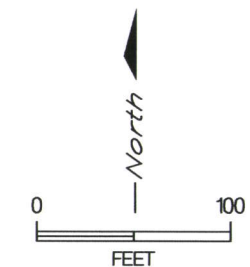


Building Legend

Building A	Laboratory/Administration
Building B	Hazardous Waste Management Building
Building C	Hazardous Waste Management Building
Building D	Hazardous Waste Management Building
Building E	Administration
Building G	Personnel Decon/Break Room
Building H	Operations Office
Building I	Hazardous Waste Management Building
Building J	Hazardous Waste Management Building
Building K	Mechanical Equipment Building
Processing Area	Hazardous Waste Management Area
Drum Dock	Hazardous Waste Management Area

Legend:

— : Railroad Tracks	Uncovered Grass or Dirt Area
-x-x-x- : Fence	Concrete
— : Property Line	Asphalt
[Red Outline] : SWMU Locations	Gravel
[Blue Outline] : AOC Locations	Structure/Building
[Thick Black Line] : Loading and Unloading Area	



BY	DATE
DRAWN CWJ	9/15/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	



SAFETY-KLEEN - WICHITA, KANSAS

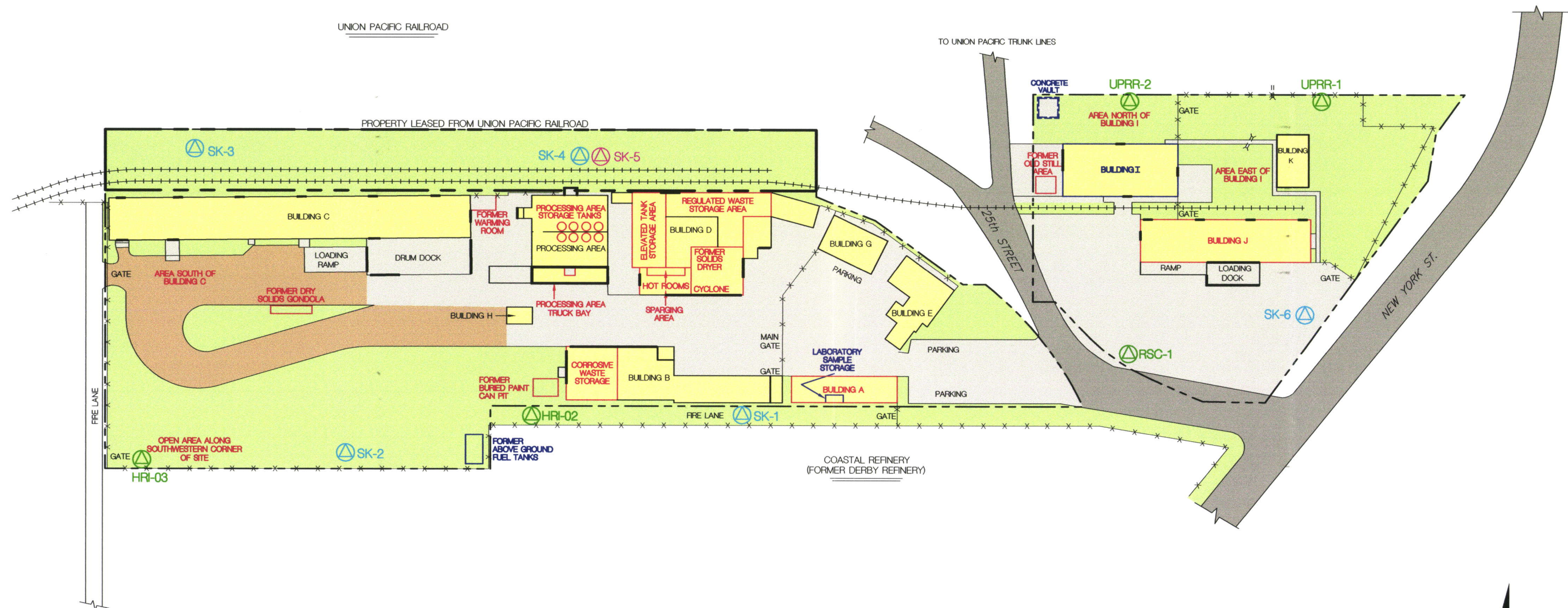
FIGURE 2 PHASE I RFI SWMUs AND AOCs

SCALE:

1" = 100'

DWG. NO:

963231-0011



Building Legend

Building A	Laboratory/Administration
Building B	Hazardous Waste Management Building
Building C	Hazardous Waste Management Building
Building D	Hazardous Waste Management Building
Building E	Administration
Building G	Personnel Decon/Break Room
Building H	Operations Office
Building I	Hazardous Waste Management Building
Building J	Hazardous Waste Management Building
Building K	Mechanical Equipment Building
Processing Area	Hazardous Waste Management Area
Drum Dock	Hazardous Waste Management Area

Legend:

+++++	: Railroad Tracks
-x-x-	: Fence
---	: Property Line
[Red Outline]	: SWMU Locations
[Blue Outline]	: AOC Locations
---	: Loading and Unloading Area
[Green Circle]	: Approximate location of existing monitoring well
[Blue Circle]	: Proposed new monitoring well location (shallow)
[Pink Circle]	: Proposed new monitoring well location (deep)
[Green Fill]	: Uncovered Grass or Dirt Area
[Grey Fill]	: Concrete
[Dark Grey Fill]	: Asphalt
[Brown Fill]	: Gravel
[Yellow Fill]	: Structure/Building

BY	DATE
DRAWN CJJ	10/3/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	



SAFETY-KLEEN - WICHITA, KANSAS

FIGURE 3 PROPOSED MONITORING WELL LOCATIONS

SCALE: 1" = 100'

DWG. NO: 963231-0007

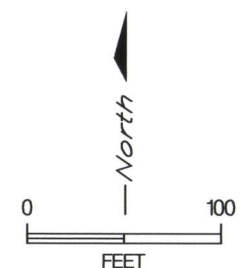
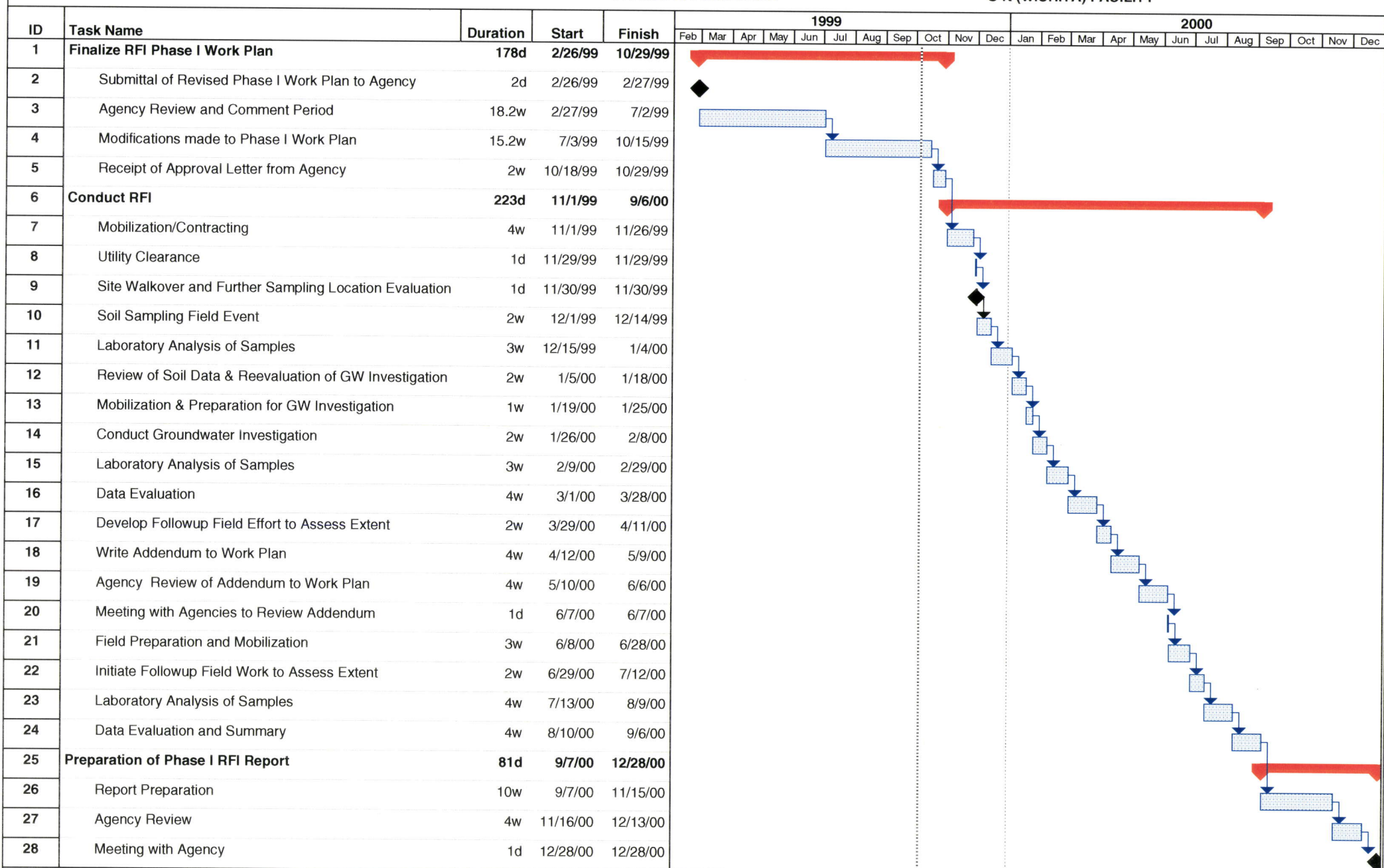


FIGURE 4

PHASE I RFI SCHEDULE

S-K (WICHITA) FACILITY



Project: Schedule for RFI.MF
Date: 10/5/99

Task

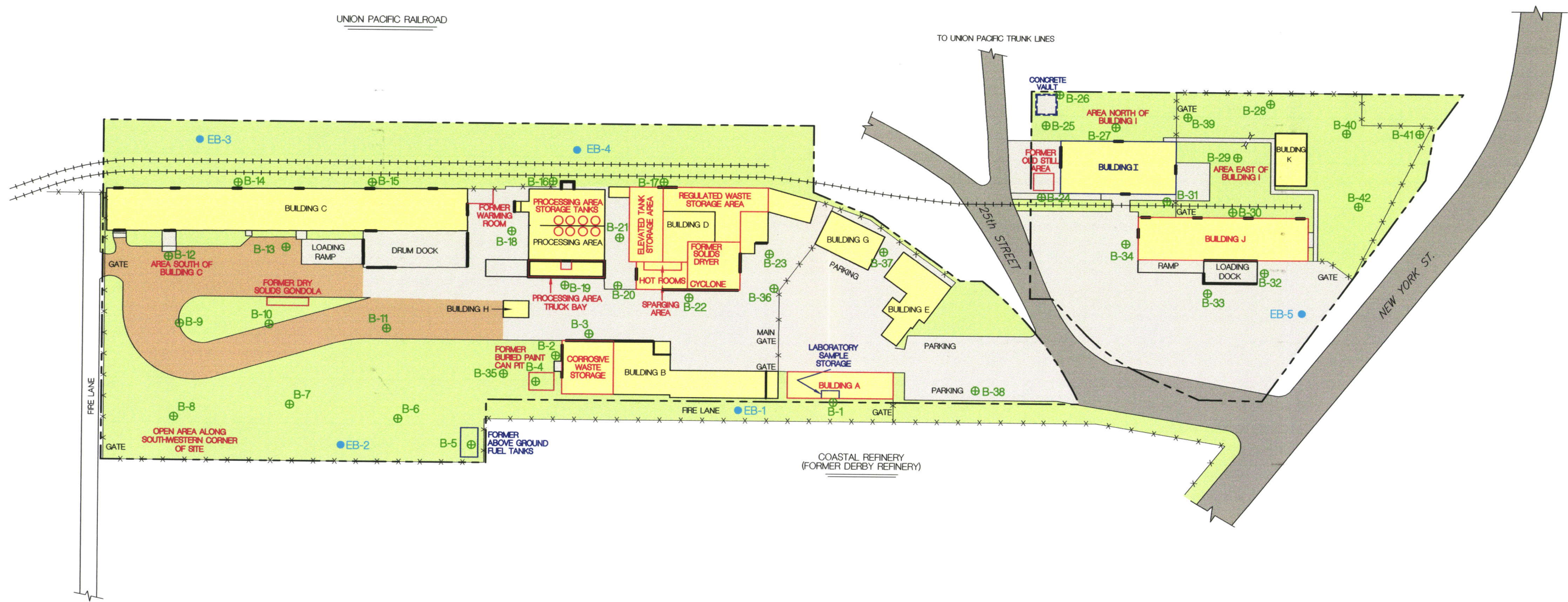


Milestone



Summary



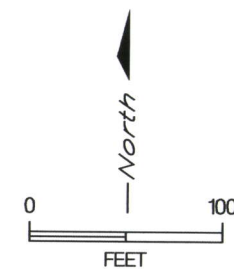


Building Legend

Building A	Laboratory/Administration
Building B	Hazardous Waste Management Building
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Building K	Mechanical Equipment Building
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Drum Dock	Hazardous Waste Management Area

Legend:

+++++	: Railroad Tracks
-x-x-	: Fence
---	: Property Line
[Red Box]	: SWMU Locations
[Blue Box]	: AOC Locations
[Thick Line]	: Loading and Unloading Area
B-6 ⊕	: Proposed Boring Location
EB-1 ●	: Exploratory Boring Location
[Green Box]	: Uncovered Grass or Dirt Area
[Grey Box]	: Concrete
[Dark Grey Box]	: Asphalt
[Brown Box]	: Gravel
[Yellow Box]	: Structure/Building



BY	DATE
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APPROVED	
APPROVED	



SAFETY-KLEEN - WICHITA, KANSAS

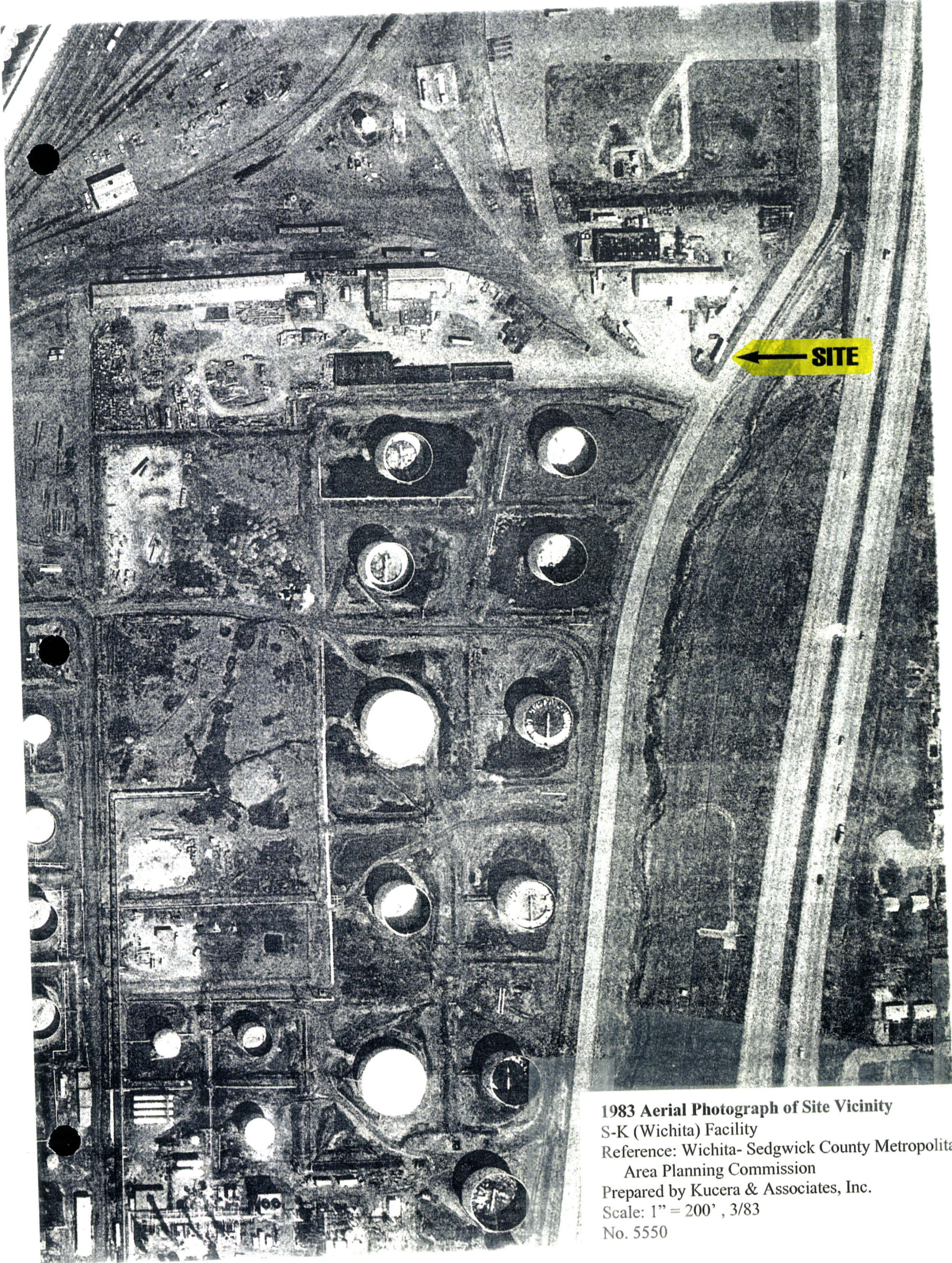
FIGURE 5 PROPOSED BORING LOCATIONS

SCALE:

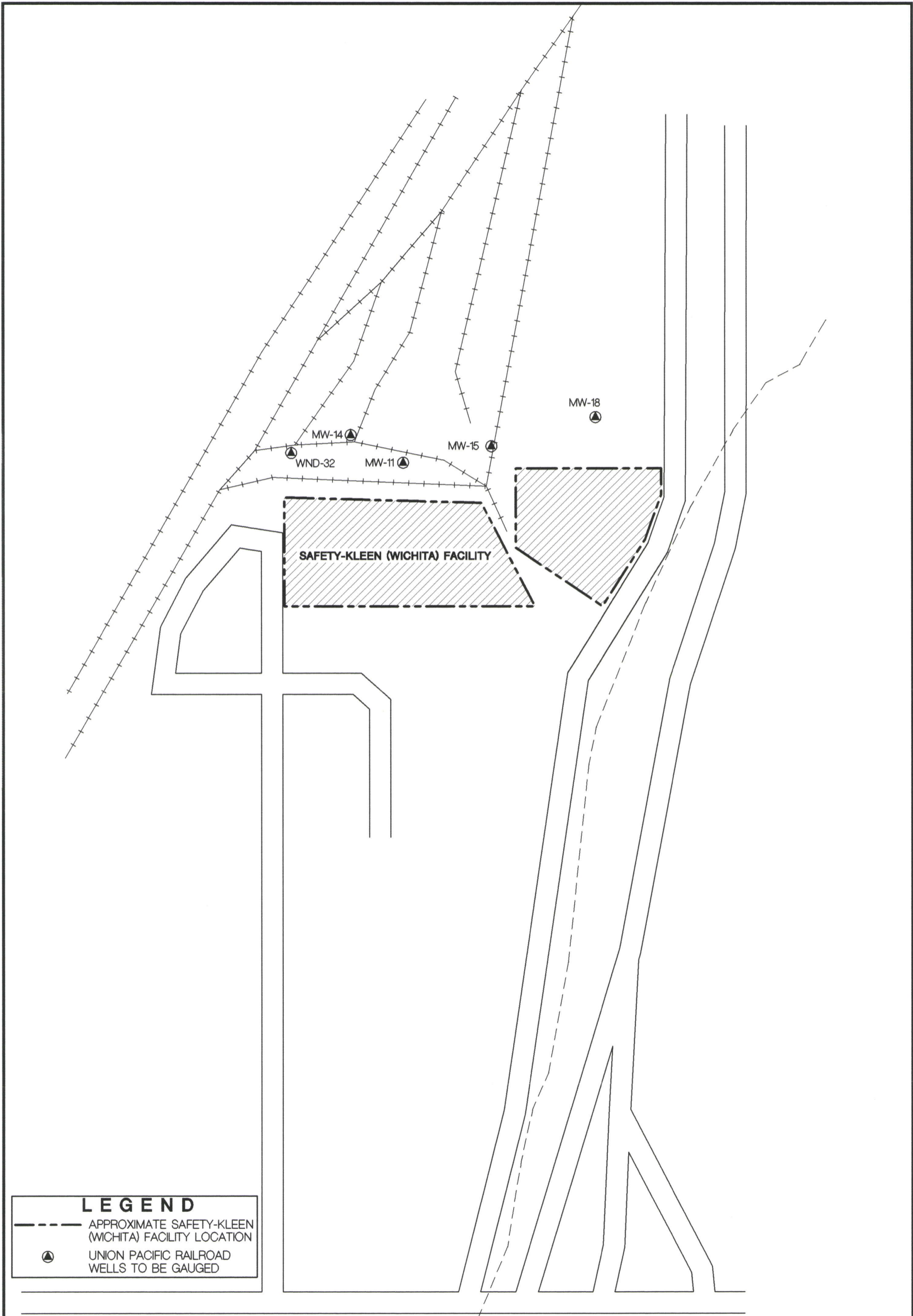
1" = 100'

DWG. NO.:

963231-0009



1983 Aerial Photograph of Site Vicinity
S-K (Wichita) Facility
Reference: Wichita- Sedgwick County Metropolitan
Area Planning Commission
Prepared by Kucera & Associates, Inc.
Scale: 1" = 200' , 3/83
No. 5550



LEGEND

APPROXIMATE SAFETY-KLEEN (WICHITA) FACILITY LOCATION

UNION PACIFIC RAILROAD WELLS TO BE GAUGED

0300

FEET

North

BY	DATE
DRAWN WRB	2/24/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	

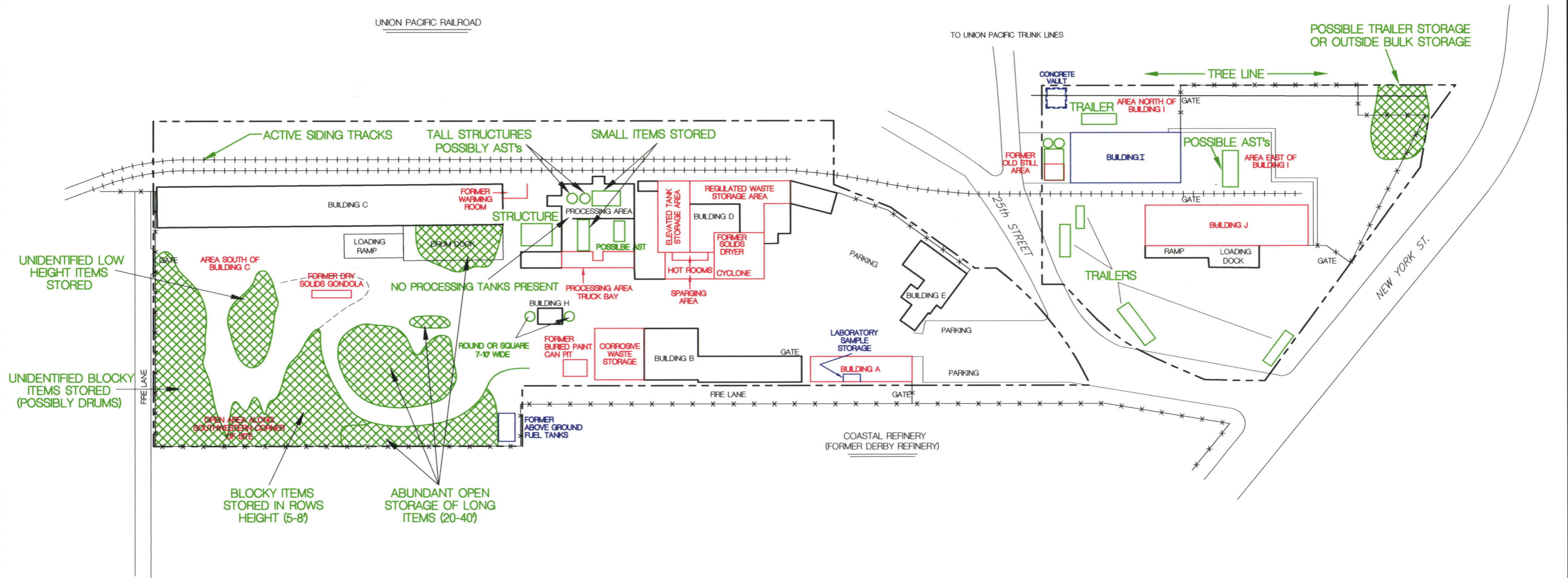
ENVIRONMENTAL
DECISION GROUP, INC.
Innovative Services • Advanced Technology
A Safety-Kleen Company

SAFETY-KLEEN FACILITY - WICHITA, KANSAS

FIGURE 6
UPRR MONITORING WELLS TO BE GAUGED

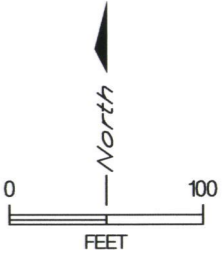
SCALE: 1" = 300'

DWG. NO: 963231-0010



NOTES: OBSERVATIONS FROM 1983 AERIAL PHOTO IN GREEN.
AREAS IN BLACK DENOTE NO OBSERVED CHANGE TO PRESENT SITE CONDITIONS.

: SWMU Locations
 : AOC Locations



BY	DATE
DRAWN C.J.J.	9/27/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	

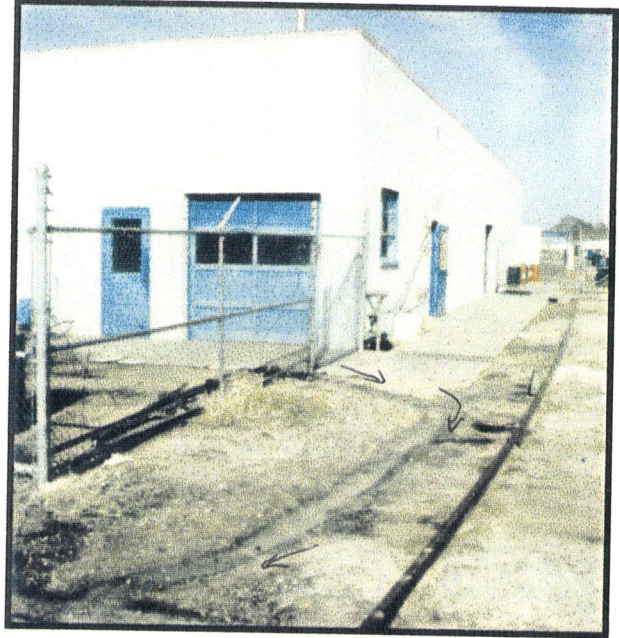


SAFETY-KLEEN - WICHITA, KANSAS
AERIAL PHOTO INTERPRETATION (1983)
SITE BASE MAP

SCALE: 1" = 100'

DWG. NO: 963231-0012

Reid Supply Co.
Wichita, Kansas
April 4, 1978



Comments: Unpermitted discharge of still bottom
and solvent residue.

APPENDIX A

Health and Safety Plan

Environmental Decision Group, Inc.

**Health and Safety Plan
for
RCRA Facility Investigation**

**Safety-Kleen (Wichita) Facility
Wichita, Kansas**

Project # 7923931

February 24, 1999

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1. INTRODUCTION

On December 19, 1986, the Occupational Safety and Health Administration (OSHA) issued, in the Federal Register, an interim final rule on hazardous waste site operations and emergency response. This rule specifically requires certain minimum standards concerning health and safety for anyone performing activities at CERCLA sites, RCRA sites, emergency response operations, sites designated for remediation by a state or local agency, or any other operations where employees' operations involve dealing with hazardous waste or hazardous constituents.

This RCRA Facility Investigation (RFI) Health and Safety Plan (HASP) has been prepared Environmental Decision Group, Inc. for use at the Safety-Kleen, Inc. Wichita Facility. All work performed at the Wichita Facility under the RFI workplan will be in accordance with applicable federal, state, and local regulations including OSHA standards contained in 29 CFR 1910.120, to protect the health and safety of the investigative team and the general public.

The provisions of the plan are mandatory for all on-site RFI field personnel. They set forth minimum requirements for contractors involved in the field activities. Safety-Kleen will continue to develop and update this HASP, as necessary, to address the evolving Health and Safety needs of the RFI project. Substantial changes will be revised and approved by Safety-Kleen health and safety staff or consultants.

Each field subcontractor may provide its own HASP for its employees, covering hazard notification and potential exposure to hazardous materials, wastes, and/or constituents, and complete all work in accordance with that plan. If the contractor chooses to use only this HASP for reference purposes, the contractor shall hold Safety-Kleen harmless from and indemnify them against, all liability in the case of an injury. Safety-Kleen maintains no responsibility whatsoever for the safety and welfare of any on-site personnel except their own employees.

Protocols exist to assure strict adherence to the HASP. The Project Manager will assign a person to act as RFI Health and Safety Officer who will primarily be responsible for making sure that the Plan is followed and understood by site personnel, and that any changes required to the Plan will be properly approved by the RFI Health and Safety Officer.

2. SCOPE OF WORK

2.1. WORK LOCATION

The Safety-Kleen Inc. Wichita Facility is located in the City of Wichita, Kansas. The site is approximately 800 feet long and up to 300 feet wide (Fig. 1, Site Location Map). The site is bordered by North New York Avenue to the East, East 25th Street North to the South, and the Union Pacific Railroad tracks to the North and West. Access to the site is gained from the west side of North New York Avenue.

2.2. SITE DESCRIPTION AND HISTORY

The property is located within a highly industrial-commercial portion of Wichita. Previous facilities located at the site include a paint company, industrial chemical distributor, bulk storage and solvent recovery facility, and a hazardous and non-hazardous waste handler and processor. Currently, Safety-Kleen Inc. (Wichita) manages a RCRA regulated facility for handling of hazardous and non-hazardous wastes.

Historically, industrial and commercial companies have used the yard for distributing, storing, and processing RCRA regulated solvents, distributing and storing industrial chemicals, and handling paint and lacquer. Typical regulated substances in use and processed at the various facilities located at the site include spent solvents, spent electroplating baths, sludges, hazardous and non-hazardous waste, chlorinated and non-chlorinated solvents, paint and lacquer wastes, waste oils, greases, waxes, flammable and corrosive wastes, and spent dry cleaning wastes.

Previous environmental investigations have been performed on and around the site. A non-contact cooling water industrial well was installed at the facility in 1990. Pumping began in January 1991 with intermittent pumping at 30 gpm. Analysis of the water discharged to the Wichita Sanitary Sewer System indicated the presence of methylene chloride, PCE, TCE, 1,2-DCE, xylenes, and toluene at concentrations of less than 100 ppb per constituent.

In 1983, the USEPA initiated an investigation into groundwater contamination in the site vicinity when two industrial wells in the Twenty-ninth Street and Mead area were found to have elevated concentrations of volatile organic compounds (VOCs). The VOCs identified included trichloroethylene (TCE), carbon tetrachloride (CCl₄), trans-1,2-dichloroethylene (tDCE), vinyl chloride, and 1,1,1-trichloroethane (TCA). After several investigations, it has been determined that the plume is a multi-source, multiple constituent contamination problem with both historical and current potential sources.

The plume covers approximately 5 miles in the North/South direction from the facility. Although the site was listed as a CERCLA site at one time, it has been delisted and the City of Wichita has taken jurisdiction over the project, with input from state and federal agencies. The industrial corridor that encompasses this large ground water plume is referred to as the North Industrial Corridor (NIC).

2.3. TIME FRAME

This project will be conducted in separate stages. The initial phase of fieldwork for the RFI will begin once final approval of the Phase I Work Plan is obtained from the involved agencies. It is anticipated that approval will be granted in the spring of 1999, and fieldwork will begin shortly thereafter.

The proposed time schedule for RFI field work is as follows:

- Receive the regulatory agencies' written approval of the final Phase I Work Plan;
- Begin RFI Work Plan field activities three (3) weeks from receipt of agencies' written approval (first phase);
- Complete the initial RFI field activities three (3) weeks from commencement of field activities;
- Submit a draft Addendum to the Phase I Work Plan thirteen (13) weeks from completion of the initial field activities to be approved by the appropriate agencies; and,
- Begin second stage of field work two (2) weeks after receipt of Agency approval of Addendum.

2.4. GENERAL SCOPE OF WORK

The general scope of work for the initial RFI field investigation will include: installation and sampling of four (4) shallow and two (2) deep monitoring wells on site; advancement of approximately thirty-six (36) soil borings; collection of shallow soil samples; and submittal of soil and groundwater samples for analysis as described in the earlier portions of this Work Plan. The soil borings will be located in and around 24 previously identified solid waste management units (SWMUs) and 4 areas of concern (AOCs) (listed on Table 1 of RFI workplan).

2.5. SPECIFIC TASKS

Specific tasks covered by this HASP will include:

- 1) Identifying monitoring well and soil boring locations;
- 2) Location of subsurface utilities and infrastructure;
- 3) Mobilization and setup of drilling equipment;
- 4) Drilling/installation of wells and soil borings;
- 5) Monitoring well gauging and sampling;
- 6) Soil sample collection; and,
- 7) Backfilling and surveying of bore holes, as needed.

2.6. PERSONNEL

Personnel planned for this project will include:

- Senior Project Manager - Carol Edson
- Project Manager - Kay Tauscher
- Field Supervisors - Ed Ullmer
(Other qualified Safety-Kleen personnel may
assume field supervisor role as needed)
- Drilling Subcontractors - To be Named

Sr. Project and Project Manager responsibilities include: client interface; compliance with applicable legal standards, policies, and procedures; reviewing HASPs; approve changes to work plan; and interactions with the Safety-Kleen field personnel, public, regulatory personnel, and client.

Field Supervisor responsibilities include, supervising drilling operation and proper handling of soil samples. Accountable for the on-site supervision of the drilling activities, subcontractors, associated personnel, and sampling. Specific responsibilities of the field supervisor include:

- on-site client interaction,
- compliance with applicable policies, procedures and laws;
- handling of reports of injury and/or illness;
- assurance of a timely, safe progression of the project;

- assurance of proper personal protection equipment (PPE) and its use;
- management of monitoring equipment;
- conductance of daily health and safety meetings;
- communication of the hazards of the site;
- maintenance of communication with all parties involved with drilling or other on-site work;
- documentation of all pertinent field activities.

Drilling Subcontractor - to be identified. Responsible for mobilization, operation and decontamination of drilling equipment. Crew will include one driller and one or two helper.

2.7. EQUIPMENT

The primary equipment for this project will include:

- Hollow-stem auger drill rig;
- GeoProbe Equipment;
- Support vehicles;
- Miscellaneous hand tools;
- Decon equipment, tools and fluid;
- Field notebook
- Surface samplers (shovels, trowels, hand augers);
- Macro-Core Sampler;
- Sample containers and coolers;
- colorimetric tubes and pump;
- Organic Vapor Monitor (OVM); and,
- PPE.

3. POTENTIAL HAZARDS

The hazards associated with the site work activities involve both health and physical hazards that would normally accompany any site investigation program. Attempts have been made to develop a plan that provides for the maximum health and safety of site personnel, the community, and the environment. However, because of the nature of the work to be performed, potential hazards can be created during the project. These hazards will be eliminated or reduced through the use of administrative controls, engineering controls and/or PPE. Administrative and engineering controls are described in Section 4 and specific uses of PPE are identified in Section 5 of this HASP.

Based upon groundwater data obtained on and near the site, it appears that the primary constituents of concern include the following: trichloroethylene (TCE), tetrachloroethene (PCE), carbon tetrachloride (CCl₄), and related daughter products. Based on the site history and identified groundwater contaminants, the primary contaminants that may be encountered in the site soils are anticipated to be volatile organic compounds. Table 1 describes the potential chemical hazards that have been identified in groundwater beneath the property, although these contaminants may be from upgradient sources. Material Safety Data Sheets (MSDS) for each chemical hazard are provided at the end of this plan. Additional potential contaminants at this site may include other VOCs, metals, semi-volatile compounds, corrosives, hydrocarbon related compounds.

Table 1
Chemicals Detected in Groundwater

Substance	PEL-TWA ppm	TLV ppm
Perchloroethylene	25	25
1,1,1-Trichloroethane (TCA)	350 C	350
1,1-Dichloroethene (DCE)	100	
1,1-Dichloroethane (DCA)	100	100
Trichloroethylene (TCE)	100	50
Carbon Tetrachloride	10	5
cis-1,2 DCE		5
Chloroform	100	10
1,2-DCA	50 C	10
Benzene	1	10
Xylene	100	100
Toluene	200	50
Vinyl Chloride	1	5
4-Bromofluorobenzene	NA	
Dibromofluoromethane		100

4. HAZARD EVALUATION

The potential hazards to on-site investigative personnel include identified and non-identified chemical substances, heat or cold stress, physical stress, harmful flora and fauna, equipment-related injuries, fire, and explosion. No confined spaces will be addressed in this scope of work; therefore, confined space entry is not addressed in this Health and Safety Plan.

Because there has been very little site soil investigation work previously conducted, the initial constituents of concern are those that have been identified in the groundwater. The permissible exposure limits (PELs) - time-weighted averages (TWAs) and threshold limit values (TLVs) for these constituents are shown in Table 1. Chemical hazards associated with these chemicals are listed in Table 2. Recent maximum detected concentrations in groundwater are less than 200 ppb. Based on these detections, the hazards presented by these chemicals are expected to be minimal. However, potential source areas for these chemicals may be encountered in the subsurface soils, where concentrations would be higher.

Table 3 lists each work task, the anticipated potential hazards, and the methods of controlling these hazards. As the work progresses, changing conditions may mitigate the existing hazards and create others. The new hazard conditions will be evaluated and the appropriate control measures will be developed as needed.

This HASP will be updated after the results of the initial sampling have been reviewed to address any additional contaminants of concern at this facility.

5. PERSONAL PROTECTIVE EQUIPMENT (PPE)

The required PPE on-site for the Soil boring and Sampling program is:

Drilling and sampling activities in Level D: (within 25 feet of drilling rig)

- safety boots with steel toe
- safety glasses with side shields
- hard hat
- leather gloves for handling equipment

Drilling and sampling activities in Level C: (Exclusion Zone)

- safety boots with steel toe*
- safety glasses with side shields
- hard hat
- nitrile gloves
- Kimberly Clark® kleanguard**
- full-face respirator with organic vapor cartridge.

* If leather boots are used and the field manager deems it necessary, boot covers will be used to protect boots.

** If free product is present then Saranex apron on coverall will be worn.

(Contaminant Reduction Zone)

- safety boots with steel toe
- safety glasses with side shields
- hard hat
- nitrile gloves
- Kimberly Clark kleanguard

(Support Zone)

- safety boots with steel toe
- safety glasses with side shields
- hard hat

6. INSTRUMENTATION AND MONITORING

<u>Instrument</u>	<u>Location of Sampling</u>	<u>Frequency</u>	<u>Action Level</u>
OVM	Breathing zone 4 to 6 ft above ground	Initially and periodically	10 ppm above background
Colorimetric Tubes	Breathing Zone	Prior to purging & sampling	1 ppm

ACTION - If 10 ppm above background is obtained for over a period of 1 minute, then colorimetric tubes for vinyl chloride, benzene, methylene chloride, 1,2-DCE, and carbon tetrachloride will be used. If vinyl chloride, benzene, carbon tetrachloride, 1,2-DCE, or methylene chloride are detected at or above 1 ppm, 1 ppm, 5 ppm, 2.5 ppm, or 12.5 ppm, respectively, then work will cease for 15 minutes. Another reading will be taken; if action points are exceeded, then work will cease in this location and the project manager will be notified. If the OVM reading is at or above 25 ppm and the five constituents are not detected (or are below the action levels), work will cease until conditions improve or continue under Level C.

Modifications to the above monitoring plan will be made as warranted by identification and review of additional contaminants identified during the drilling program.

All instrument readings will be recorded in the project's daily log book and/or the project's instrumentation log book. Results, environmental conditions, date, time, and the operator's initials will be logged. The OVM and other monitoring instruments will be calibrated according to the manufactures specifications prior to the start of work each day.

7. SITE CONTROL MEASURES

In the absence of identified soil contamination, establishment of a formalized exclusion zone/transition zone/support zone is regarded as unnecessary and impractical unless Level C PPE is required. It is anticipated that most, if not all of the site investigation work will be conducted under Level D.

7.1. EXCLUSION ZONE

A 25-foot radius around the active boring will be the designated as the Exclusion Zone (EZ). Entry to the EZ will be restricted to personnel that are properly protected by wearing the required PPE and to those personnel that have (1) completed the required 40-hour health and safety training, or equivalent, (2) been medically evaluated and found to be "medically fit" to work at a hazardous waste site. All work with the hazardous material will be confined to this area.

No smoking, eating, or chewing of gum or tobacco will be allowed within the Exclusion Zone. Drinking water will be located greater than 25 feet from the drill site. If Level C (or higher) PPE becomes temporarily necessary, it will be removed at the drill site and decontaminated or disposed of properly.

If necessary, traffic cones will be set around the drill rig and work area to detour vehicle traffic.

7.2. CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) is the transition area between the contaminated area and the clean area. This zone is designed to reduce the probability that the clean Support Zone will become contaminated or affected by other site hazards.

Personnel entering the CRZ should be required to wear the personal protective clothing and equipment prescribed for working in the CRZ. The reenter the Support Zone, workers should remove any protective clothing and equipment worn in the CRZ. Decontamination personnel in the CRZ often wear one level of protection below what is required in the EZ.

7.3. SUPPORT ZONE

The Support Zone will include all areas not in the EZ. This zone will not be restricted and will function as the area in which all non-investigative activities will be located. The project location site is a fenced RCRA regulated facility, thus access by the general public is strictly controlled.

8. DECONTAMINATION PROCEDURES

Decontamination guidelines and procedures are necessary to protect workers at the site and to prevent the unnecessary spread or release of contaminants. Drilling equipment, including rig augers, drill rods, sampling equipment and drilling tools will be cleaned within a designated Decontamination Area at the site. Decontamination procedures will involve a high pressure sprayer or steam cleaner for use on heavy equipment, using potable water. Decon water will be contained on site in 55 gallon closed top drums or disposed of on site if State and local regulations permit. If used, sampling equipment (i.e. trowels, augers, shovels, and other reusable items) will be decontaminated with mild soap and water prior to collection of each sample. Sampling gloves and other disposable PPE that are in direct contact with samples will be changed between samples. Personnel will be encouraged to maintain good personal hygiene at the completion of each day's activities by using waterless soap to clean hands and towelettes to clean the face while still in the decontamination zone.

Contaminated disposable PPE and drill cuttings will be stored in drums on-site until analysis determines disposal method.

9. TRAINING

All SK personnel working with this project will have completed 40-hour health and safety training according to 29 CFR 1910.120 (e); be current with the annual health and safety refresher training; and be respirator fit-tested. Supervisory personnel will have completed an additional 8 hours of supervisory training.

Personnel using monitoring instruments will have completed an 8-hour field instrument training class.

Prior to beginning operation at the Site, approved subcontractors must provide proof of 1) current 40-hour health and safety training; 2) medical certification as "medically fit" to work at the Site; and respirator fit testing. All on-site workers or visitors must read and sign this health and safety plan prior to conducting any activities on-site.

Safety meetings will be held daily, or more frequently as deemed necessary by the field supervisor to ensure the proper application of the HASP.

10. MEDICAL MONITORING

Employees working at the Site will have received a pre-employment and annual physical, and be certified to be capable of working at a hazardous waste site. All contractors, subcontractors, clients, and other Site visitors are required to provide documentation of 40-hour health and safety training and medical certification prior to involvement with the field activities. Proof of health and safety compliance will be maintained at the Site and/or the Contractor's office.

10.1. HAZARD COMMUNICATION PROGRAM

In compliance with OSHA and Safety-Kleen policies, the MSDS sheets for the suspected contaminants are included in this HASP.

10.2. RESPIRATORY PROTECTION PROGRAM

In compliance with OSHA and Safety-Kleen policies a written respiratory program is available for review at the project office upon request. Safety-Kleen personnel have been trained in the use, maintenance, inspection, and storage of respiratory protective equipment. Individuals are issued their own personal respirator and receive additional replacement parts and cartridges as necessary.

If the action point of 12.5 ppm TWA for methylene chloride (50% of the exposure limit; Table 1) is exceeded, all potentially exposed employees will participate in a supervised medical monitoring event as required by OSHA regulation 1910.1052.

11. EMERGENCY PLAN

In the event of an emergency, the on-site Field supervisor will be responsible for alerting personnel and providing instructions for response or evacuation. Personnel will be alerted either verbally, or with the field vehicle car horn.

A fire extinguisher (ABC type), first aid kit, and an eye wash will be available on site.

Should an injury occur, the immediate well-being of the injured party is the primary concern. Emergency telephone numbers and route to the nearest emergency medical facility are:

Emergency Numbers

Fire, Police, Ambulance911
Emergency Number for St. Francis Hospital (316) 268-5052

Directions to St. Francis Hospital:

(See Figure 2 for mapped route)

Directions from site:

- Exit facility and turn right on New York Street
- Go left on 21st Street to I-135 south
- South on I-135 to 9th Street
- West (right) on 9th Street to St. Francis Street
- North (right) on St. Francis to hospital (on left)

Additional Numbers

For fire, police, or ambulance service in an emergency, dial 911. For non-emergency situations, the following information is provided.

Safety Kleen: (303) 938-5500 - General, Boulder, CO office
(303) 938-5535 - Kay Tauscher, Project Manager
(303) 938-5552 - Carol Edson, Sr. Project Manager
(316) 269-7484 - Ron Robertson, Site Contact
(303) 938-5556 - Jerome Edwards, Director of Consulting Services

All persons, entering the work area (Safety-Kleen employees, subcontractors, visitors, clients, regulatory agency personnel, etc.) must read the health and safety plan and acknowledge by their signature that they have understood the plan and will abide by the requirements.

NAME	SIGNATURE	REPRESENTING	DATE/TIME
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This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

TABLE 2
CHEMICAL CHARACTERISTICS

Substance	Symptoms of Exposure	Hazard Potential	Route of Exposure	IDLH	Properties
Benzene	Irritated eyes, skin, nose, respiratory system; headache, nausea, giddiness, staggered gait;	Inhalation	Inhalation, Ingestion, Absorption, Dermal Contact	500 ppm	Colorless to a light yellow liquid with an aromatic odor.
Chloroform	Irritated eyes or skin; dizziness; mental dullness, nausea, confusion.	Absorption	Absorption, inhalation, ingestion, dermal contact	500 ppm	Colorless liquid with a pleasant odor.
cis-1,2 DCE	Irritated eyes, respiratory system; CNS depression	Inhalation		1000 ppm	
Carbon Tetrachloride	Irrit eyes; skin, CNS depres; nau, vom; liver, kidney; drow, dizz; inco	Inhalation	Inhalation, Ingestion, dermal, absorption	Ca (200 ppm)	colorless lqd; ether-like odor
1,1-Dichloroethane (DCA)	Irritated skin; CNS depression, liver, kidney, lung damage	Inhalation	Inhalation, ingestion, dermal contact.	5000 ppm	Colorless oily liquid, with a chloroform-like odor.
1,2-DCA	Irrit eyes; com opac; CNS depres; nau, vom; liver, kidney; CVS damage	Inhalation	Inhalation, Ingestion, dermal, absorption	Ca (50 ppm)	Colorless liquid with a pleasant chloroform-like odor
1,1-Dichloroethylene (DCE)	Irritated eyes, respiratory system; CNS depression	Inhalation	Inhalation, ingestion, dermal contact.	1000 ppm	Colorless liquid with a slightly acid, chloroform-like odor.

TABLE 2
CHEMICAL CHARACTERISTICS

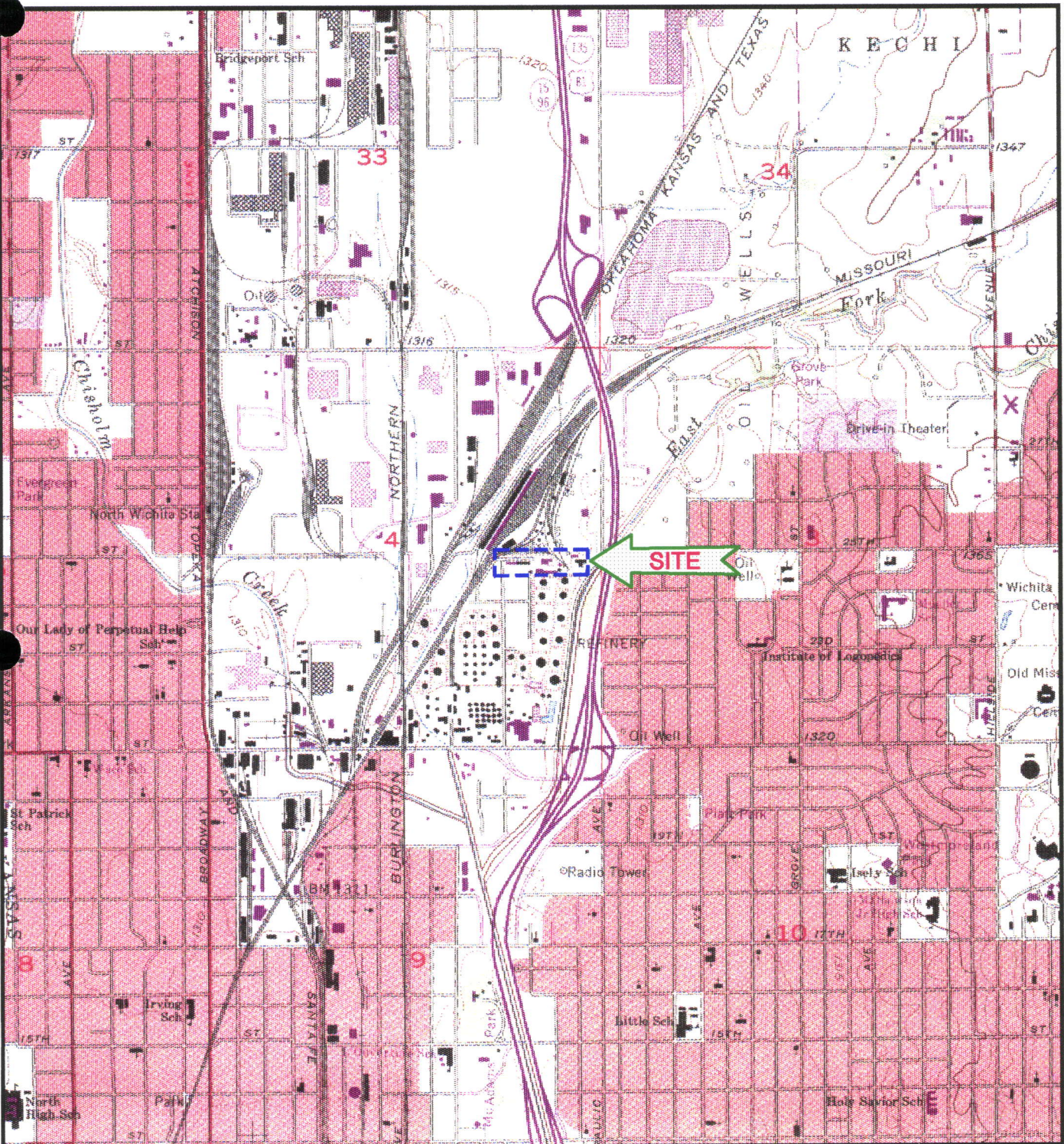
1,2-DCE	Eye and respiratory system irritation	Inhalation	inhalation, ingestion, dermal contact	1000 ppm	colorless liquid with slight acrid odor
Perchloroethylene	eye, nose & throat irritation, nausea, dizziness, flush face and neck.	Inhalation	inhalation, ingestion, dermal contact, dermal absorption	150 ppm (ca)	colorless liquid with mild chloroform odor
Toluene	eye and nose irritation, fatigue, dilated pupils, dizziness	Inhalation	inhalation, ingestion, dermal contact, dermal absorption	500 ppm	colorless liquid with sweet benzene like odor
1,1,1-Trichloroethane (TCA)	Irritated eyes or skin; headache, CHS depression, poor equilibrium.	Inhalation	Inhalation, ingestion, dermal contact.	700 ppm	Colorless liquid with a mild chloroform-like odor.
Trichloroethylene (TCE)	Nausea	Inhalation	inhalation, ingestion, dermal contact, dermal absorption	1000 ppm (ca)	colorless liquid with chloroform-like odor
Vinyl Chloride	Weak, abdominal pain, GI bleeding.	Dermal Contact	Inhalation, dermal contact.	Ca (ND)	Colorless gas or liquid with a pleasant odor.
Xylene	Eye, skin, nose and throat irritation, dizziness, excitement, vomit, abdominal pain	Inhalation	inhalation, ingestion, dermal contact, dermal absorption	900 ppm	colorless liquid with aromatic odor

Table 3: Potential On-site Hazards / Controls - Listed by Task

Task	Potential Hazards	Controls
All Tasks	Unsafe Actions	Employees are responsible to be fit for work.
	Heat Stress	Take periodic breaks as needed. Adequate and readily available drinking water supply. Monitor for symptoms of heat stress. Add shading or adjust work schedule, as needed.
	Pinch Points	Avoid pinch points such as placing fingers in-between moving parts.
	Personnel Injuries	Use proper lifting procedures, use legs not back. Get help from co-workers in moving equipment.
	Nearby Traffic	Stay out of roadway near industrial park.
	Excessive Noise	Wear hearing protection when within 25 feet of drilling while in operation.
Task 1 Identify boring/well locations	Potential for later working in confined areas with inadequate access.	Move locations as allowed by workplan. Ensure provisions for drill rig access.
Task 2 Location and identification of utilities	Contact with utilities during drilling work.	Maintain 25 foot clearance between drilling mast and overhead lines, or lockout/tagout power procedures. Use knowledgeable site personnel to identify on-site utility corridors. Local utilities will be notified as required by law.
Task 3 Mobilization and Setup	Strains, Pulls	Utilize proper lifting techniques when loading and unloading supplies
	Vehicle traffic	Stay Alert. Use spotters when backing. Have backup alarms on vehicles. Fluorescent vests will be worn if traffic is present.
Task 4 Drilling of Soil borings/wells	Drilling Rig	Use of qualified driller. No personnel will be permitted to approach the work area without reviewing and signing the HASP. Keep clear of pinch points. Wear proper PPE.

Table 3: Potential On-site Hazards / Controls - Listed by Task

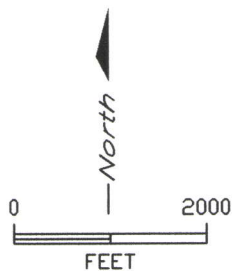
Task	Potential Hazards	Controls
	Overhead / Underground Utilities	Perform utilities check prior to drilling.
	Slips/Trips/Falls	Maintain level working/walking area. Keep clutter to minimum. Remove debris and tools. Mark and cover open boreholes.
	Chemical	Wear proper PPE (Section 5). Monitor breathing zone (Section 6)
Task 5 Sample Collection	Chemical	Wear proper PPE (Section 5).
Task 6 Backfilling and surveying of boreholes	Cuts/Lacerations, other physical injuries.	Keep open boreholes covered until ready to backfill. Use approved subcontract surveyors. Keep alert for vehicle traffic.



MAP ADAPTED FROM U.S.G.S 7.5' SERIES
QUADRANGLE WICHITA EAST, KANSAS



QUADRANGLE LOCATION




**ENVIRONMENTAL
DECISION GROUP, INC.**
Innovative Services • Advanced Technology
A Safety-Kleen Company

WICHITA, KANSAS

FIGURE 1
SITE LOCATION MAP

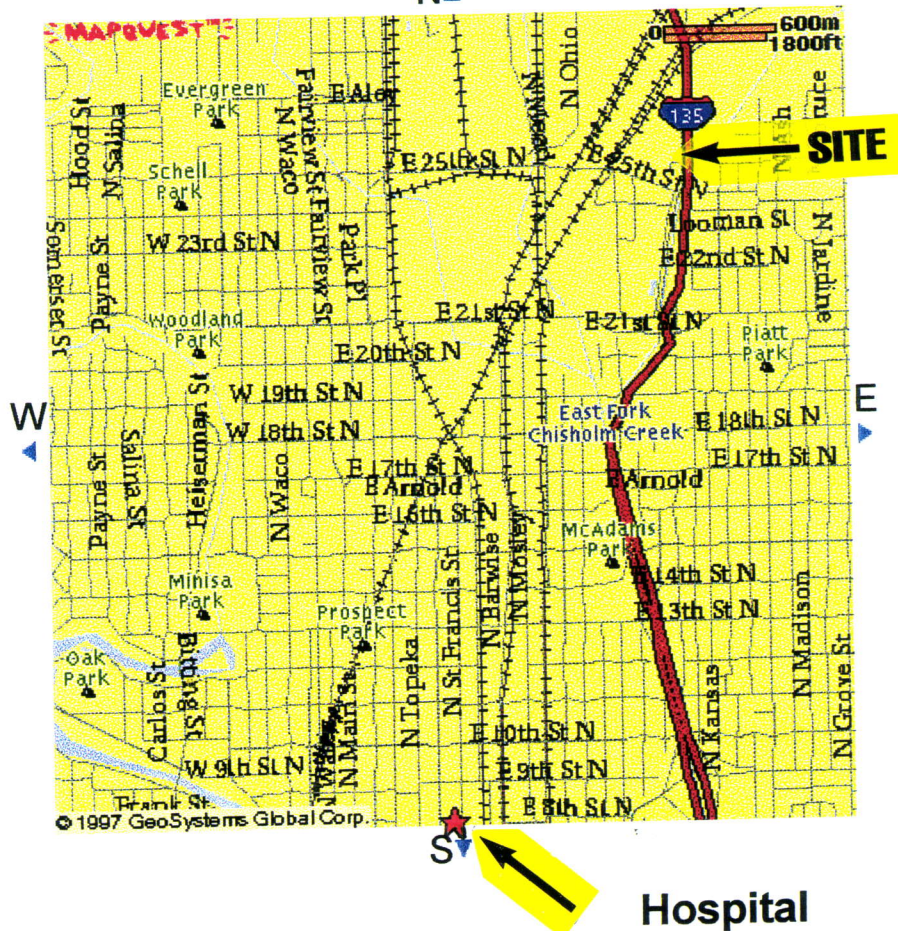
SCALE: 1" = 2000'

DATE: 5/26/98

Directions to Hospital:

Zoom Out ◀ ◀ ◀ ◀ ◀ ◀ ◀ ◀ ▶ ▶ Zoom In

N



BOUGHT ACCORDING TO TECHNICAL GRADE SPEC -- BENZENE, TECHNICAL GRADE - BENZENE, TECH
MATERIAL SAFETY DATA SHEET

FSC: 6810

NIIN: 000586987

Manufacturer's CAGE: 96412

Part No. Indicator: A

Part Number/Trade Name: BENZENE, TECHNICAL GRADE

=====

General Information

=====

Item Name: BENZENE, TECHNICAL GRADE

Company's Name: BOUGHT ACCORDING TO TECHNICAL GRADE SPEC

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Date MSDS Prepared: 01JAN85

Safety Data Review Date: 08SEP78

MSDS Serial Number: BCWNG

Hazard Characteristic Code: F3

Unit Of Issue: CN

Unit Of Issue Container Qty: 1 QT

Type Of Container: METAL

=====

Ingredients/Identity Information

=====

Proprietary: NO

Ingredient: BENZENE (SARA III)

Ingredient Sequence Number: 01

NIOSH (RTECS) Number: CY1400000

CAS Number: 71-43-2

OSHA PEL: 1PPM/5STEL; 1910.1028

ACGIH TLV: 10 PPM; A2; 9192

=====

Physical/Chemical Characteristics

=====

Fire and Explosion Hazard Data

=====

Flash Point: 12F CC

=====

Reactivity Data

=====

Health Hazard Data

=====

Precautions for Safe Handling and Use

=====

Control Measures

=====

Transportation Data

=====

Trans Data Review Date: 82257

DOT PSN Code: BRS

DOT Proper Shipping Name: BENZENE

DOT Class: 3

DOT ID Number: UN1114

DOT Pack Group: II

DOT Label: FLAMMABLE LIQUID

IMO PSN Code: BXB

IMO Proper Shipping Name: BENZENE

IMO Regulations Page Number: 3185

IMO UN Number: 1114
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: DBA
IATA UN ID Number: 1114
IATA Proper Shipping Name: BENZENE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI Prop. Shipping Name: UNDER REVIEW

=====

Disposal Data

=====

Disposal Data Review Date: 89024
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE,
CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U019
1st EPA Haz Wst Name New: BENZENE
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO

=====

Label Data

=====

Label Required: YES
Label Status: G
Common Name: BENZENE, TECHNICAL GRADE
Label Name: BOUGHT ACCORDING TO TECHNICAL GRADE SPEC

=====

URL for this msds <http://hazard.com>. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

CASEWAY CASEVILLE MI 48725 -- SC 125
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F004210
Manufacturer's CAGE: CASEW
Part No. Indicator: A
Part Number/Trade Name: SC 125

=====

General Information

=====

Company's Name: CASEWAY/CASEVILLE, MI 48725
Company's Emerg Ph #: (517) 856-2215
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 29DEC86
MSDS Serial Number: BBPSR

=====

Ingredients/Identity Information

=====

Proprietary: NO
Ingredient: METHYLENE CHLORIDE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: PA8050000
CAS Number: 75-09-2
OSHA PEL: 500 PPM/C, 1000; Z2
ACGIH TLV: 50 PPM, A2; 9192

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: COLORLESS LIQUID, ETHER-LIKE ODOR
Boiling Point: 104F
Vapor Pressure (MM Hg/70 F): 352
Vapor Density (Air=1): 2.93
Specific Gravity: 1.32
Solubility In Water: SLIGHT

=====

Fire and Explosion Hazard Data

=====

Flash Point: NONE
Extinguishing Media: FOAM, DRY CHEMICAL, CO2
Special Fire Fighting Proc: USE SELF-CONTAINED BREATHING APPARATUS
Unusual Fire And Expl Hazrds: AT HIGH TEMPERATURES METHYLENE CHLORIDE CAN DECOMPOSE, GIVING OFF HYDROGEN CHLORIDE GAS/PHOSGENE.

=====

Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): OPEN FLAMES, ELECTRICAL ARC
Materials To Avoid: ALUMINUM, TITANIUM, PURE OXYGEN AND ALKALI METALS
Hazardous Decomp Products: HYDROGEN CHLORIDE/PHOSGENE/TOXIC PROD IN SMALL QUANTITIES.
Hazardous Poly Occur: NO

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Health Hazard Data

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Signs/Symptoms Of Overexp: HEADACHE/METAL CONFUSION/DEPRESSION/
FATIGUE/LOSS OF APPETTIE/NAUSEA/VOMITING/COUGH/LOSS BALANCE.
Emergency/First Aid Proc: REMOVE PATIENT IMMEDIATELY FROM THE CONTAMINATED AREA. OBTAIN MEDICAL ASSITANCE AS SOON AS POSSIBLE. WASH THOROUGHLY WITH WATER ANY BODY AREAS CONTAMINATED WITH METHYLENE CHLORIDE. IF INGESTED, DO NOT INDUCE VOMITING.

=====

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: CONTAIN BY DIKING OR OBSORBING ON AN ABSORBENT MATERIAL. USE ADEQUATE PERSONAL PROTEIVE EQUIPMENT WHEN CLEANING UP.

Waste Disposal Method: COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS.

Precautions-Handling/Storing: UNDER NORMAL CONDITIONS METHYLENE CHLORIDE MAY BE STORED SATISFACTORILY IN GALVANIZED, IRON, BCK IRON, OR STEEL. STORE DRUMS IN A COOL PLACE.

Other Precautions: VENTILATION SHOULD BE PROVIDED AT THE FLOOR LEVEL. DO NOT STORE IN PITS, DEPRESSIONS, BASEMENTS OR UNVENTILATED AREAS.

Control Measures

Respiratory Protection: SCBA/POSITIVE PRESS HOSEMASKS/ARILINE MASK IN POORLY VENTILATED AREA

Ventilation: LOCAL EXHAUST SUFFICIENT TO MAINTAIN TLV.

Protective Gloves: NEOPRENE/RUBBER

Eye Protection: GOGGLES

Other Protective Equipment: NEOPRENE APRON/BOOTS & ARM GUARDS TO PREVENT CONTAMINATION.

Suppl. Safety & Health Data: MSDS DATE: JAN 1986.

Transportation Data

Disposal Data

Disposal Data Action Code: A

Disposal Data Review Date: 88055

Rec # For This Disp Entry: 01

Tot Disp Entries Per NSN: 001

Landfill Ban Item: YES

Disposal Supplemental Data: MSDS DATE: JAN 1986. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.

1st EPA Haz Wst Code New: U080

1st EPA Haz Wst Name New: METHYLENE CHLORIDE; DICHLOROMETHANE

1st EPA Haz Wst Char New: TOXIC (T)

1st EPA Acute Hazard New: NO

Label Data

Label Required: YES

Label Status: G

Common Name: SC 125

Special Hazard Precautions: HEADACHE/METAL CONFUSION/ DEPRESSION/FATIGUSE/LOSS OF APPETTIE/NAUSEA/VOMITING/COUGH/LOSS BALANCE.

Label Name: CASEWAY/CASEVILLE, MI 48725

Label Emergency Number: 517) 856-2215

URL for this msds <http://hazard.com>. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

MATHESON GAS PRODUCTS -- VINYL CHLORIDE
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00N034925
Manufacturer's CAGE: 0FB11
Part No. Indicator: A
Part Number/Trade Name: VINYL CHLORIDE

=====
General Information
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Company's Name: MATHESON GAS PRODUCTS
Company's Street: 932 PATTERSON PLANK RD
Company's City: EAST RUTHERFORD
Company's State: NJ
Company's Country: US
Company's Zip Code: 07073
Company's Emerg Ph #: 201-933-2400
Company's Info Ph #: 201-933-2400
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01OCT85
Safety Data Review Date: 09OCT92
MSDS Serial Number: BQCBT
Hazard Characteristic Code: G2

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Ingredients/Identity Information
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Proprietary: NO
Ingredient: ETHYLENEM, CHLORO-; (VINYL CHLORIDE) (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KU9625000
CAS Number: 75-01-4
OSHA PEL: SEE 1910.1017
ACGIH TLV: 5 PPM, A1; 9293

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Physical/Chemical Characteristics
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Appearance And Odor: COLORLESS, HIGHLY FLAMM GAS WITH A PLEASANT, SWEET
ODOR AT HIGH CONC.
Boiling Point: 7.2F,-13.8C
Melting Point: -245F,-154C
Vapor Pressure (MM Hg/70 F): 234KPA@21C
Specific Gravity: 2.21
Solubility In Water: 1.07 CM3/1 ML H*2O

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Fire and Explosion Hazard Data
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Lower Explosive Limit: 4%
Upper Explosive Limit: 22%
Extinguishing Media: TO EXTING A VINYL CHLORIDE FIRE STOP THE FLOW OF GAS.
IF THE FLOW CANNOT BE STOPPED, LET THE FIRE BURN ITSELF(SUPP DATA)
Special Fire Fighting Proc: FIRE FIGHTERS MUST WEAR NIOSH/MSHA APPROVED
SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). FIREIGHTERS TURNOUT GEAR IS
INADEQUATE.
Unusual Fire And Expl Hazrds: CYLINDERS THAT ARE EXPOSED TO FIRE MAY
RUPTURE WITH VIOLENT FORCE. EXTING SURROUNDING FIRE & KEEP CYLINDERS COOL
USING A WATER SPRAY APPLIED FROM THE(SUPP DATA)

=====
Reactivity Data
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Stability: YES
Cond To Avoid (Stability): AVOID EXPOSURE TO SUNLIGHT, HEAT, AIR, OXYGEN

PEROXIDES AND OTHER STRONG OXIDIZING AGENTS.

Materials To Avoid: OXIDIZING MATLS, ACTIVE METALS, ALUMINUM ALLOYS AND ORGANOMETALLICS.

Hazardous Decomp Products: HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE.

Hazardous Poly Occur: YES

Conditions To Avoid (Poly): OXYGEN (AIR), HEAT, SUNLIGHT, MOISTURE AND FREE RADICAL INITIATORS OR OTHER CATALYTIC MATERIALS.

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Health Hazard Data

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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: INHAL MAY CAUSE DROWS, BLURRED VISION, STAG GAIT, & TINGLING & NUMBNESS IN THE FEET & HANDS. IN HIGH CONC VINYL CHLORIDE ACTS AS AN ANESTHETIC. CONTACT WITH LIQ VINYL CHLORIDE MAY CAUSE SEVERE IRRITATION & BURNS. CHRONIC: VINYL CHLORIDE IS A RECOGNIZED CARCINOGEN & HAS CAUSED CANCER IN MAN. (EFTS OF OVEREXP)

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: YES

Explanation Carcinogenicity: VINYL CHLORIDE: KNOWN CARCINOGEN (NTP), GROUP 1 (IARC); OSHA REGULATED

Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: INHAL: MOVE VICTIM TO FRESH AIR. IF NOT BRTHG, GIVE ARTF RESP. IF BRTHG IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

EYE/SKIN: IMMED FLUSH EYE/SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MIN.

REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN. INGEST: GET MD IMMEDIATELY (FP N). NOTE: SKIN BURNS CAN BE TREATED BY THE APPLICATION OF MAGNESIUM PASTE (MAGNESIUM OXIDE AND GLYCERINE).

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE AREA. PERSONNEL EQUIPPED W/SPECIAL PERSONAL PROTECTIVE SUITS FOR FIRE/CHEMICALS AND POSITIVE PRESSURE NIOSH/MSHA APPROVED SCBA CAN RE-ENTER THE AREA AND ATTEMPT TO STOP LEAK.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: CYLINDERS SHOULD BE STORED AND USED IN DRY, WELL VENT AREAS AWAY FROM SOURCES OF HEAT OR IGNITION. DO NOT STORE WITH OXIDIZERS.

Other Precautions: BEFORE USING: 1) SECURE CYLINDER TO PVNT IT FROM FALLING OR BEING KNOCKED OVER. 2) INSTALL CHECK VALVES/TRAPS TO PVNT SUCKBACK TO CYLINDER. 3) LEAK CHECK LINES & EQUIP. 4) HAVE APPRVD RESP PROT & OTHER PROT EQUIP. 5) HAVE AN EMER (SUPP DAT

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Control Measures

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Respiratory Protection: NIOSH/MSHA APPROVED POSITIVE PRESSURE SCBA SHOULD BE WORN IF IT IS SUSPECTED THAT VINYL CHLORIDE IS IN THE AIR.

Ventilation: NONE SPECIFIED BY MANUFACTURER.

Protective Gloves: IMPERVIOUS GLOVES.

Eye Protection: CHEM WORK GOGG/FULL LENGTH FSHLD (FP N).

Other Protective Equipment: EYE WASH STATIONS & SAFETY SHOWERS READILY AVAILABE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: EXTING MEDIA: OUT WHILE COOLING CYLINDER & SURROUNDINGS USING A H*2O SPRAY. EXPLO HAZ: MAX POSS DISTANCE. FLAMM & TOX GASES MAY SPREAD FROM A SPILL AFTER FIRE IS EXTING & BE SUBJECT TO REIGNIT. THERMAL DECOMP PRODS MAY INCL HCL & PHOSGENE (FP N). OTHER PREC: PLAN COVERING STEPS TO BE TAKEN IN CASE OF ACCIDENTAL RELEASE.

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Transportation Data

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Trans Data Review Date: 93083
DOT PSN Code: PRS
DOT Proper Shipping Name: VINYL CHLORIDE, INHIBITED OR VINYL CHLORIDE,
STABILIZED *
DOT Class: 2.1
DOT ID Number: UN1086
DOT Label: FLAMMABLE GAS
IMO PSN Code: PJJ
IMO Proper Shipping Name: VINYL CHLORIDE, INHIBITED
IMO Regulations Page Number: 2186
IMO UN Number: 1086
IMO UN Class: 2(2.1)
IMO Subsidiary Risk Label: -
IATA PSN Code: ZHW
IATA UN ID Number: 1086
IATA Proper Shipping Name: VINYL CHLORIDE, INHIBITED
IATA UN Class: 2.1
IATA Label: FLAMMABLE GAS
AFI PSN Code: ZHW
AFI Symbols: 0
AFI Prop. Shipping Name: VINYL CHLORIDE, INHIBITED
AFI Class: 2.1
AFI ID Number: UN1086
AFI Label: FLAMMABLE GAS
AFI Basic Pac Ref: 6-6,6-8

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 08OCT92
Label Date: 24SEP92
Label Status: G
Common Name: VINYL CHLORIDE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: FLAMMABLE GAS! HAZARDOUS POLYMERIZATION MAY
OCCUR. CYLINDERS SHOULD BE STORED AND USED IN DRY, WELL VENT AREAS AWAY
FROM SOURCES OF HEAT OR IGNITION. DO NOT STORE WITH OXIDIZERS. ACUTE: INHAL
MAY CAUSE DROWS, BLURRED VISION, STAG GAIT, & TINGLING & NUMBNESS IN THE
FEET & HANDS. IN HIGH CONC VINYL CHLORIDE ACTS AS AN ANESTHETIC. CONTACT
CANCER HAZARD. VINYL CHLORIDE IS A CARCINOGEN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: MATHESON GAS PRODUCTS
Label Street: 932 PATTERSON PLANK RD
Label City: EAST RUTHERFORD
Label State: NJ
Label Zip Code: 07073
Label Country: US
Label Emergency Number: 201-933-2400

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delete information in this archive please sent updates to dan@hazard.com.

OCTAGON PROCESS -- MIL-T-81533A; 1, 1, 1-TRICHLOROETHANE - 1,1,1,-TRICHLOROETHANE,T
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 004765613
Manufacturer's CAGE: 82925
Part No. Indicator: A
Part Number/Trade Name: MIL-T-81533A; 1, 1, 1-TRICHLOROETHANE
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General Information
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Item Name: 1,1,1,-TRICHLOROETHANE, TECHNICAL
Company's Name: OCTAGON PROCESS INC.
Company's Street: 596-RIVER ROAD
Company's City: EDGEWATER
Company's State: NJ
Company's Country: US
Company's Zip Code: 07020-1105
Company's Emerg Ph #: 201-945-9400
Company's Info Ph #: 201-945-9400
Record No. For Safety Entry: 010
Tot Safety Entries This Stk#: 017
Status: SM
Date MSDS Prepared: 27FEB87
Safety Data Review Date: 16JUN89
Supply Item Manager: CX
MSDS Serial Number: BGWYD
Specification Number: MIL-T-81533
Hazard Characteristic Code: T4
Unit Of Issue: DR
Unit Of Issue Container Qty: 54.0 GL
Type Of Container: DRUM
Net Unit Weight: 54.0 GL
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Ingredients/Identity Information
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Proprietary: NO
Ingredient: METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE) (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KJ2975000
CAS Number: 71-55-6
OSHA PEL: 350 PPM/450 STEL
ACGIH TLV: 350 PPM/450 STEL; 9192
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Physical/Chemical Characteristics
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Appearance And Odor: CLEAR, COLORLESS LIQUID, MILD CHLOROFORM-LIKE ODOR.
Boiling Point: 165F/74C
Vapor Pressure (MM Hg/70 F): 100
Vapor Density (Air=1): 4.54
Specific Gravity: 1.3
Evaporation Rate And Ref: 0.35 (ETHYL-ETHER-1)
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100
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Fire and Explosion Hazard Data
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Flash Point: NONE
Lower Explosive Limit: 7.0
Upper Explosive Limit: 15.0
Extinguishing Media: CO2, DRY CHEMICAL FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA IN AN ENCLOSED AREA.
Unusual Fire And Expl Hazrds: AVOID EXTREME HEAT; TOXIC VAPORS OF HCL OR
=====

PHOSGENE GAS.

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Reactivity Data

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Stability: YES

Cond To Avoid (Stability): OPEN FLAMES, HOT GLOWING SURFACES, ELECTRIC ARCS.

Materials To Avoid: CAUSTIC SODA, CAUSTIC POTASH OXIDIZING AGENTS.

Hazardous Decomp Products: HCL AND TRACES OF PHOSGENE

Hazardous Poly Occur: NO

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Health Hazard Data

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Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE: IRRITATION OF EYES, SKIN AND
RESPIRATORY TRACT: CNS EFFECTS, HEADACHE, LOSS OF CO-ORDINATION. CHRONIC;
CARDIAC ARRHYTHMIA, CNS DEPRESSION, DERMATITIS, LUNG, KIDNEY AND LIVER DAMAGE.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS DATA.

Med Cond Aggravated By Exp: RESPIRATORY AILMENTS, DERMATITIS, CIRRHOSIS OF
THE LIVER.Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR. CPR, GET MEDICAL
ATTENTION IMMEDIATELY. EYES: FLUSH WITH PLENTY OF WATER FOR ABOUT 15
MINUTES, CALL A PHYSICIAN IF NEEDED; SLIN: WASH THOROUGHLY WITH WATER AND
SOAP, USE CREAM AGAINST DERMATITIS. INGESTION: DO NOT INDUCE VOMITING; CALL A
PHYSICIAN IMMEDIATELY.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: USE PROPER PERSONAL PROTECTION: REMOVE ALL
IGNITION SOURCES. CONTAIN FREE LIQUID IF POSSIBLE. USE SUITABLE INERT
ABSORBENT MATERIAL AND RECOVERY FOR PROPER DISPOSAL.Waste Disposal Method: INCINERATION OR DISPOSAL MUST BE IN ACCORDANCE WITH
LOCAL AND STATE AND FEDERAL REGULATIONS.Precautions-Handling/Storing: STORE IN COOL AND DRY AREA. DO NOT BREATHE
VAPORS/MIST; DO NOT USE CONTAMINATED CLOTHES; DO NOT EAT, DRINK AND SMOKE IN
WORK AREA.

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Control Measures

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Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR ORGANIC,
VAPORS/MIST IF ABOVE PEL/TLV.

Ventilation: LOCAL/GENERAL TO MAINTAIN PEL/TLV.

Protective Gloves: NEOPRENE

Eye Protection: CHEMICAL GOGGLES

Other Protective Equipment: EYE-WASH, SAFETY SHOWER, APRON

Work Hygienic Practices: AVOID CONTACT WITH EYES AND SKIN; WORK IN GOOD
VENTILATED AREA WHILE USING THIS PRODUCT.

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Transportation Data

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Trans Data Review Date: 89167

DOT PSN Code: OQD

DOT Proper Shipping Name: 1,1,1- TRICHLOROETHANE *

DOT Class: 6.1

DOT ID Number: UN2831

DOT Pack Group: III

DOT Label: KEEP AWAY FROM FOOD

IMO PSN Code: OVK

IMO Proper Shipping Name: 1,1,1- TRICHLOROETHANE *

IMO Regulations Page Number: 6272

IMO UN Number: 2831
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: YLY
IATA UN ID Number: 2831
IATA Proper Shipping Name: 1,1,1- TRICHLOROETHANE *
IATA UN Class: 6.1
IATA Label: TOXIC *
AFI PSN Code: YLY
AFI Prop. Shipping Name: 1,1,1- TRICHLOROETHANE *
AFI Class: 6.1
AFI ID Number: UN2831
AFI Pack Group: III
AFI Label: KEEP AWAY FROM FOOD
AFI Special Prov: N36
AFI Basic Pac Ref: 10-10

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Disposal Data

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Label Data

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Label Required: YES
Label Status: F
Special Hazard Precautions: VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION.
EXPOSURE IN AN ENCLOSED AREA MAY BE VERY HARMFUL. CONTACT MAY IRRITATE OR
BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF
FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: OCTAGON PROCESS INC.
Label Street: 596 RIVER ROAD
Label City: EDGEWATER
Label State: NJ
Label Zip Code: 07020-1105
Label Country: US
Label Emergency Number: 201-945-9400

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delete information in this archive please sent updates to dan@hazard.com.

OCEAN COATINGS -- 1001 VAPOR BARRIER
MATERIAL SAFETY DATA SHEET
FSC: 8010
NIIN: 00N036506
Manufacturer's CAGE: 61895
Part No. Indicator: A
Part Number/Trade Name: 1001 VAPOR BARRIER

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General Information

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Company's Name: OCEAN COATINGS INC
Company's Street: 5364 PAN AMERICAN FREEWAY
Company's City: ALBUQUERQUE
Company's State: NM
Company's Country: US
Company's Zip Code: 87109
Company's Emerg Ph #: 800-677-3473; 800-424-9300 (CHEMTREC)
Company's Info Ph #: 800-677-3473
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01AUG91
Safety Data Review Date: 16NOV92
MSDS Serial Number: BQRBK
Hazard Characteristic Code: N1

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: ETHYLENE, 1,1-DICHLORO-; (VINYLIDENE CHLORIDE) (SARA III)
Ingredient Sequence Number: 01
Percent: <10
NIOSH (RTECS) Number: KV9275000
CAS Number: 75-35-4
OSHA PEL: 1 PPM
ACGIH TLV: 5 PPM; 20 PPM STEL

Proprietary: NO
Ingredient: ETHYLENE GLYCOL (SARA III)
Ingredient Sequence Number: 02
Percent: <1
NIOSH (RTECS) Number: KW2975000
CAS Number: 107-21-1
OSHA PEL: 50 PPM, C
ACGIH TLV: 50 PPM, C

Proprietary: NO
Ingredient: DIETHYLENE GLYCOL
Ingredient Sequence Number: 03
Percent: <1
NIOSH (RTECS) Number: ID5950000
CAS Number: 111-46-6
OSHA PEL: NOT APPLICABLE
ACGIH TLV: 50 PPM (MFR)

Proprietary: NO
Ingredient: SUPP DATA: VICTIM IS CONSCIOUS & NOT CONVULSING, GIVE 2-4
GLASSES OF WATER & THEN INDUCE VOMIT BY TOUCHING FINGERS (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999Z
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 4: TO BACK OF THROAT. AFTERWARDS, GIVE 1-2 OUNCES OF MILK OF MAGNESIA.DO NOT TRY TO GIVE ANYTHING TO AN UNCON(ING 6)
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 5: PERSON. GET MEDICAL ATTENTION IMMEDIATELY.
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
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Physical/Chemical Characteristics
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Appearance And Odor: WHITE, VISCOUS, OPAQUE LIQUID. MILD, CHARACTERISTIC ODOR.
Boiling Point: 230F,110C
Vapor Pressure (MM Hg/70 F): 24 @ 25C
Vapor Density (Air=1): <1 (LTR)
Specific Gravity: 1.22-1.26
Solubility In Water: COMPLETE (SUPP DATA)
Percent Volatiles By Volume: 45-55
pH: SUPDAT
=====

Fire and Explosion Hazard Data
=====

Flash Point: NONE
Flash Point Method: PMCC
Extinguishing Media: LIQ PAINT IS NON COMBUST. DRY PAINT WILL NOT SUPPORT COMBUST.USE WATER SPRAY, DRY CHEM (ABC) AGENTS/OTHER EXTING (SUPDAT)
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP(FP N).MOVE CNTNRS FROM FIRE AREA IF POSS.COOL CNTNRS WHICH HAVE BEEN EXPOS TO FLAME BY SPRAYING THEM WITH (SUPDAT)
Unusual Fire And Expl Hazrds: CONTAINERS MAY DEVELOP PRESSURE AND BURST IF EXPOSED TO HEAT OR FLAME.
=====

Reactivity Data
=====

Stability: YES
Cond To Avoid (Stability): EXTREME HEAT OR COLD.
Materials To Avoid: STRONG OXIDIZERS, ALKALIS/ACIDS. AVOID PRLNGD CONT BETWEEN MATL & UNPROT METALS. DO NOT STORE/TRANSFER MATL IN (SUPDAT)
Hazardous Decomp Products: COMBUSTION PRODUCTS CAN INCLUDE OXIDES OF CARBON AND NITROGEN, AND HYDROGEN CHLORIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.
=====

Health Hazard Data
=====

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: VAPORS MAY CAUSE EYE, RESPIRATORY, AND SKIN IRRITATION. PROLONGED DERMAL CONTACT WITH LIQUID MATERIAL MAY CAUSE TRANSIENT REDDENING OR IRRITATION OF SKIN.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE: IMMEDIATE FLUSH W/WATER. REMOVE CONTACT LENSES & FLUSH EYES W/WATER FOR AT LEAST 15 MINS INCL UNDERNEATH EYELIDS. GET MED ATTN IF IRRIT PERSISTS. SKIN: REMOVE CONTAMINATED CLOTHING IMMEDIATELY. RINSE AFFECTED AREAS W/WATER FOR AT LEAST 15 MINS. DO NOT WEAR CLOTHING WHICH IS STILL WET W/ PROVIDE ADEQUATE VENT. IF IRRIT OCCURS REMOVE TO FRESH AIR. (SUPDAT)

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: PLACE LEAKING CONTAINERS IN WELL VENT AREA. WEAR PROTECTIVE CLOTHING. CONFINE SPILLED MATERIAL AND ABSORB ON SAND, SAWDUST, EARTH, OR OTHER AVAILABLE SOLIDS. SWEEP AND PLACE IN SUITABLE CONTAINER. RINSE MINOR SPILLS INTO SEWER IF PERMITTED BY FED, ST, & LOCAL REGS.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: INCINERATE SOLIDIFIED WASTE OR BURY IN A SUITABLE, APPROVED LANDFILL. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (F.P.N.).

Precautions-Handling/Storing: DO NOT STORE IN UNLINED METAL CONTAINERS.

KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION.

Other Precautions: AVOID CONTACT WITH SKIN AND EYES. WASH THOROUGHLY AFTER HANDLING.

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Control Measures

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Respiratory Protection: WEAR A NIOSH/MSHA APPROVED RESPIRATOR SUITABLE FOR USE WITH NUISANCE DUSTS AND MISTS IS RECOMMENDED FOR USE WHEN ADEQUATE VENTILATION CANNOT BE PROVIDED.

Ventilation: LOCAL EXHAUST FANS MAY BE NECESSARY TO CONTROL MIST AND VAPOR. MECHANICAL: NORMAL ROOM VENT SYSTEMS SHOULD BE ADEQUATE.

Protective Gloves: LATEX, PVC/OTHER WATER IMPERMEABLE GLOVES

Eye Protection: CHEMICAL WORKERS GOGGLES (F.P.N.).

Other Protective Equipment: AS MAY BE NECESSARY TO PREVENT EXCESSIVE SKIN CONTACT.

Work Hygienic Practices: AVOID CONTACT WITH SKIN AND EYES. WASH THOROUGHLY AFTER HANDLING.

Suppl. Safety & Health Data: PH: 8.5-9.5 (20C). SOL IN H₂O: (AS COLLOIDAL DISPERSION). EXTING MEDIA: AGENTS AS REQD BY SURROUNDING MATERIALS. FIRE FIGHT PROC: WATER. WITHDRAW IMMEDIATELY FROM AREA IF CONTAINERS BEGIN TO VENT/BECOME DISCOLORED DUE TO FIRE. MATERIALS TO AVOID: UNCOATED METAL CONTAINERS. FIRST AID PROC: CONSULT PHYS IF IRRIT PERSISTS. INGEST: IF (ING 4)

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Transportation Data

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Trans Data Review Date: 93159
DOT PSN Code: EUD
DOT Proper Shipping Name: DICHLOROETHYLENE
DOT Class: 3
DOT ID Number: UN1150
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: FKP
IMO Proper Shipping Name: 1,2- DICHLOROETHYLENE *
IMO Regulations Page Number: 3205
IMO UN Number: 1150
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: IXI
IATA UN ID Number: 1150
IATA Proper Shipping Name: DICHLOROETHYLENE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: IXI
AFI Prop. Shipping Name: DICHLOROETHYLENE
AFI Class: 3

AFI ID Number: UN1150
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

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Disposal Data
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Label Data
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Label Required: YES
Technical Review Date: 16NOV92
Label Date: 11NOV92
Label Status: G
Common Name: 1001 VAPOR BARRIER
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: VAPORS MAY CAUSE EYE, RESPIRATORY, AND
SKIN IRRITATION. PROLONGED SKIN CONTACT MAY CAUSE IRRITATION. CHRONIC: NONE
SPECIFIED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: OCEAN COATINGS INC
Label Street: 5364 PAN AMERICAN FREEWAY
Label City: ALBUQUERQUE
Label State: NM
Label Zip Code: 87109
Label Country: US
Label Emergency Number: 800-677-3473;800-424-9300(CHEMTREC)

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delete information in this archive please sent updates to dan@hazard.com.

SUPELCO -- 48512, 1,1-DICHLOROETHANE 5G
MATERIAL SAFETY DATA SHEET
FSC: 6850
NIIN: 00N032521
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: 48512, 1,1-DICHLOROETHANE 5G

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General Information

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Company's Name: SUPELCO INC
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: 814-359-3441
Company's Info Ph #: 814-359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 18FEB86
Safety Data Review Date: 16AUG95
MSDS Serial Number: BPNCB
Hazard Characteristic Code: F3
Unit Of Issue: NK
Unit Of Issue Container Qty: UNKNOWN
Type Of Container: UNKNOWN
Net Unit Weight: UNKNOWN

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: P-DIOXANE; (DIOXANE). LD50: (ORAL,RAT) 4200 MG/KG
Ingredient Sequence Number: 01
Percent: 3
NIOSH (RTECS) Number: JG8225000
CAS Number: 123-91-1
OSHA PEL: S, 100 PPM
ACGIH TLV: S, 25 PPM; 9293

Proprietary: NO
Ingredient: ETHANE, 1,1-DICHLORO- (SARA III). LD50: (ORAL,RAT) 725 MG/KG
Ingredient Sequence Number: 02
Percent: 97
NIOSH (RTECS) Number: KI0175000
CAS Number: 75-34-3
OSHA PEL: 100 PPM
ACGIH TLV: 200 PPM;250 STEL

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS LIQUID, CHLOROFORM-LIKE ODOR.
Boiling Point: 135F, 57C
Melting Point: -143F, -97C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.777 (H2O=1)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: NOT APPLICABLE
Percent Volatiles By Volume: N/A

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Fire and Explosion Hazard Data

=====

Flash Point: 17.0F, -8.3C
Lower Explosive Limit: 6%
Upper Explosive Limit: 16%
Extinguishing Media: WATER, CO2, DRY CHEMICAL, ALCOHOL FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: VAPS FORM EXPLO MIX W/AIR. FOLLOWING TOX VAPS ARE FORMED WHEN MATL IS HEATED TO DECOMP: HCL GAS & PHOSGENE GAS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): WELL RELEASE FLAMMABLE AND TOXIC ACETALDEHYDE GAS ON CONTACT WITH STRONG CAUSTIC.
Materials To Avoid: OXIDIZERS, CAUSTIC.
Hazardous Decomp Products: HYDROGEN CHLORIDE GAS AND PHOSGENE GAS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50: (ORAL,RAT) 725 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: HARMFUL IF ABSORBED THRU SKIN. HARMFUL IF INHALED/SWALLOWED. IRRIT SKIN. DERMATITIS. DEPRESSES CNS. NARCOSIS. LIVER & KIDNEY DMG. CHLOROCARBON MATLS HAVE PRODUCED SENSIT OF THE MYOCARDIUM TO EPINEPHRINE IN LABORATORY ANIMALS & COULD HAVE A SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEHPRINE) (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: P-DIOXANE: (IARC) GROUP 2B, (NTP) ANTICIPATED TO BE A CARCINOGEN.
Signs/Symptoms Of Overexp: HLTH HAZ: MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHORNICALLY EXPOSED TO CHLOROCARBONS (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: FLUSH EYES WITH WATER FOR AT LEAST 15 MIN. SKIN: FLUSH SKIN WITH LARGE VOLUMES OF WATER. REMOVE CONTAMINATED CLOTHING. INHAL: IMMEDIATELY MOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING IS LABORED. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. CONTACT A PHYSICIAN. INGEST: GET MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP WITH ABSORBENT MATERIAL. VENTILATE AREA. FLUSH AREA WITH WATER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN SEALED CONTAINER IN COOL, DRY LOCATION. KEEP AWAY FROM IGNITION SOURCES. STABILIZED WITH 3% DIOXANE, A RECOGNIZED CARCINOGEN.
Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN THE GENERAL VICINITY OF ARC WELING, OPEN FLAMES OR HOT SURFACES. HEAT AND/OR UV RADIATION MAY CAUSE THE FORMATION OF HCL AND/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED SCBA.
Ventilation: USE ONLY IN WELL VENTILATE AREA.

Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: NOT APPLICABLE
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

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Transportation Data

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Trans Data Review Date: 95228
DOT PSN Code: ETR
DOT Proper Shipping Name: 1,1- DICHLOROETHANE *
DOT Class: 3
DOT ID Number: UN2362
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: FKF
IMO Proper Shipping Name: 1,1- DICHLOROETHANE *
IMO Regulations Page Number: 3205
IMO UN Number: 2362
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: IWY
IATA UN ID Number: 2362
IATA Proper Shipping Name: 1,1- DICHLOROETHANE *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: IWY
AFI Prop. Shipping Name: 1,1- DICHLOROETHANE *
AFI Class: 3
AFI ID Number: UN2362
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7
MMAC Code: NR
Additional Trans Data: NONE

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 15JUL92
Label Date: 10JUL92
Label Status: G
Common Name: 48512, 1,1-DICHLOROETHANE 5G
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: EXTREMELY FLAMMABLE. AVOID OXIDIZERS,
CAUSTICS. DECOMPOSITION PRODUCTS MAY BE HAZARDOUS. ACUTE: HARMFUL IF
SWALLOWED/INHALED/ABSORBED THROUGH SKIN. IRRITATES SKIN, MAY CAUSE
DERMATITIS. MAY CAUSE CNS DEPRESSION, NARCOSIS, LIVER/KIDNEY DAMAGE,
IRREGULAR HEARTBEAT. CHRONIC: CANCER HAZARD. DIOXANE IS LISTED AS A
CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INC
Label Street: SUPELCO PARK
Label City: BELLEFONTE

Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: 814-359-3441

=====
URL for this msds <http://hazard.com>. If you wish to change, add to, or
delete information in this archive please sent updates to dan@hazard.com.

E I DUPONT & -- CHLOROFORM - CHLOROFORM,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002646609
Manufacturer's CAGE: 18873
Part No. Indicator: A
Part Number/Trade Name: CHLOROFORM

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General Information

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Item Name: CHLOROFORM,ACS
Company's Name: E.I. DUPONT DE NEMOURS & COMPANY, INC
Company's Street: 1007 MARKET STREET
Company's P. O. Box: 1635
Company's City: WILMINGTON
Company's State: DE
Company's Country: US
Company's Zip Code: 19899
Company's Emerg Ph #: 800-441-3637 OR 800-345-9999
Company's Info Ph #: 302-999-2161 OR 800-441-7575
Distributor/Vendor # 1: MMM SUPPLY INC
Distributor/Vendor # 1 Cage: 7X274
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 010
Status: SE
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 16MAR91
Supply Item Manager: CX
MSDS Serial Number: BDQSH
Specification Number: O-C-265
Hazard Characteristic Code: T3
Unit Of Issue: PT
Unit Of Issue Container Qty: 16 FL OUNCES
Type Of Container: BOTTLE
Net Unit Weight: 1.6 LBS

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: CHLOROFORM (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: FS9100000
CAS Number: 67-66-3
OSHA PEL: (C) 50 PPM
ACGIH TLV: 10 PPM; A2; 9293

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS LIQUID WITH PLEASANT, SWEET ODOR.
Boiling Point: 142F,61C
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): 160
Vapor Density (Air=1): 4.13
Specific Gravity: 1.5
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: < 1 (ETHER = 1)
Solubility In Water: SLIGHT
Viscosity: UNKNOWN
Corrosion Rate (IPY): UNKNOWN

=====

Fire and Explosion Hazard Data

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Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: NONFLAMMABLE AND NONEXPLOSIVE IN AIR.
Special Fire Fighting Proc: FIREMAN SHOUL WEAR RESPIR PROTECTION(SCBA)
Unusual Fire And Expl Hazrds: NONFLAMMABLE.IN PRESENCE OF STRONG ALKALI
AND WATER,CHLOROFORM MAY BECOME VIOLENTLY EXPLOSIVE.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): EXCESS WATER,FLAME,HOT SURFACES MAY PRODUCE
TOXIC GASES.
Materials To Avoid: WATER,AIR,SUNLIGHT CAN CAUSE SLOW OXIDATION TO
PHOSGENE.
Hazardous Decomp Products: PHOSGENE,HYDROGEN CHLORIDE.
Hazardous Poly Occur: NO

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Health Hazard Data

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Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: CHLOROFORM IS SUSPECTED BY NTP AND IARC TO BE
CARCINOGENIC.
DIZINESS,UNCONS,EQUILIBRIUM LOSS,IRRITATS,LIVER DAMAGE.
Emergency/First Aid Proc: SKIN:WASH W.SOAP & H2O EYES:FLUSH W. H2O.
REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEED. KEEP WARM & QUIET. REMOVE
CONTAMINATED CLOTHING. IF UNCONS DO NOT TAKE ANYTHING BY MOUTH.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE UNPROTECTED PERSONS. ELIM IGNITION
SOURCES. STOP LEAK. H2O SPRAY COOL CONT/DIVERT SPILL FROM FIRE/HEAT.
LG SPILL:DIKE W COMMERCIAL ABSORBENT,PUMP INTO COVERED DRUMS
Waste Disposal Method: ABSORB WITH VERMICULITE,OTHER COMMERCIAL
ABSORBENT.KEEP IN COVERED DRUMS PENDING DISPOSAL.HANDLE AND DISPOSE IAW
LOCAL,STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: DO NOT STORE IN ALUMINUM CANS.KEEP BUNG
TIGHTLY CLOSED.STORE IN COOL,DRY PLACE.KEEP CONTAINER CLOSED.
Other Precautions: REMOVE CONTAMINATED CLOTHING PROMPTLY.FLUSH AFFECTED
AREA WITH WATER.DRY OR WASH CLOTHING BEFORE REUSE.

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Control Measures

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Respiratory Protection: NO SPECIAL REQMENTS UNDER ORDINARY CONDITIONS/
ADEQUATE VENT.
Ventilation: LOCAL EXHAUST FOR ADEQUAT VENT.MECH(TO OUTSIDE VIA SCRUBBER)
Protective Gloves: NEOPRENE
Eye Protection: CHEM SPLASH GOGGLES
Other Protective Equipment: NEOPRENE CLOTHING,SAFETY SHOES TO AVOID
CHLOROFORM SPLASHES.
Suppl. Safety & Health Data: STORAGE CODE T4 RATHER THAN T1 BECAUSE ITEM
IS NOT A KNOWN CARCINAGEN,BUT IS SUSPECTED(ACGIH-1983-84).

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Transportation Data

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Trans Data Review Date: 84108
DOT PSN Code: DHF
DOT Proper Shipping Name: CHLOROFORM
DOT Class: 6.1
DOT ID Number: UN1888
DOT Pack Group: II
DOT Label: KEEP AWAY FROM FOOD *

IMO PSN Code: EEH
IMO Proper Shipping Name: CHLOROFORM
IMO Regulations Page Number: 6103
IMO UN Number: 1888
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: GJO
IATA UN ID Number: 1888
IATA Proper Shipping Name: CHLOROFORM
IATA UN Class: 6.1
IATA Label: TOXIC *
AFI PSN Code: GJO
AFI Prop. Shipping Name: CHLOROFORM
AFI Class: 6.1
AFI ID Number: UN1888
AFI Pack Group: II
AFI Label: POISON
AFI Special Prov: N36
AFI Basic Pac Ref: 10-9

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Disposal Data

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Disposal Data Review Date: 88085
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 005
Landfill Ban Item: YES
Disposal Supplemental Data: STORAGE CODE T4 RATHER THAN T1 BECAUSE ITEM IS NOT A KNOWN CARCINAGEN, BUT IS SUSPECTED (ACGIH-1983-84). IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U044
1st EPA Haz Wst Name New: CHLOROFORM; TRICHLOROMETHANE
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS; MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY GIVE OFF POISONOUS GASES AND CAUSE WATER POLLUTION. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES.
Label Name: DU PONT E I DE NEMOURS AND CO INC
Label Street: 1007 MARKET STREET
Label P.O. Box: 1635
Label City: WILMINGTON
Label State: DE
Label Zip Code: 19899
Label Country: US
Label Emergency Number: 800-441-7515

=====

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SUPELCO -- 48800 4-BROMOFLUOROBENZENE 1ML - ANALYTICAL STANDARD IN METHANOL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 00F024299
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: 48800 4-BROMOFLUOROBENZENE 1ML

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General Information

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Item Name: ANALYTICAL STANDARD IN METHANOL
Company's Name: SUPELCO INCORPORATED
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: (814) 359-3441
Company's Info Ph #: (814) 359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 15APR91
Safety Data Review Date: 12AUG92
Preparer's Company: SUPELCO INCORPORATED
Preparer's St Or P. O. Box: SUPELCO PARK
Preparer's City: BELLEFONTE
Preparer's State: PA
Preparer's Zip Code: 16823-0048
MSDS Serial Number: BNXL

=====

Ingredients/Identity Information

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Proprietary: NO
Ingredient: 1-BROMO-4-FLUOROBENZENE *92-2*
Ingredient Sequence Number: 01
Percent: 2.5
NIOSH (RTECS) Number: 1008337BF
CAS Number: 460-00-4

Proprietary: NO
Ingredient: METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS
Ingredient Sequence Number: 02
Percent: 97.5
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S,200PPM/250STEL
ACGIH TLV: S,200PPM/250STEL; 93
Other Recommended Limit: 200 PPM

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR COLORLESS LIQUID
Boiling Point: 149F
Melting Point: -144.4F
Vapor Pressure (MM Hg/70 F): 100
Vapor Density (Air=1): 1.10
Specific Gravity: 0.790
Evaporation Rate And Ref: (ETHER = 1): >1
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100%

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Fire and Explosion Hazard Data

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Flash Point: 50F
Lower Explosive Limit: 6%
Upper Explosive Limit: 36.5%
Extinguishing Media: CO2, DRY CHEMICAL, OR ALCOHOL FOAM
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS

=====

Reactivity Data

=====

Stability: YES
Materials To Avoid: OXIDIZING AGENTS, CHROMIC ANHYDRIDE, LEAD PERCHLORATE, PERCHLORIC ACIDS
Hazardous Poly Occur: NO

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Health Hazard Data

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LD50-LC50 Mixture: ORAL LD50 (RAT): 5628 MG/KG METHANOL
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALATION: HARMFUL, HEADACHE, & NAUSEA.
INGESTION: GASTROINTESTINAL DISTURBANCES, BLINDNESS OR FATAL.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: INHALATION: HARMFUL, HEADACHE, & NAUSEA.
INGESTION: GASTROINTESTINAL DISTURBANCES, BLINDNESS OR FATAL.
Emergency/First Aid Proc: EYES/SKIN: FLUSH W/WATER FOR 15 MINS.
INHALATION: REMOVE TO FRESH AIR. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. INGESTION: NEVER GIVE ANYTHING BY MOUTH TO UNCONSCIOUS PERSON. NEVER TRY TO MAKE UNCONSCIOUS PERSON VOMIT. GIVE 2 TABLESPOONS OF BAKING SODA IN A GLASS OF WATER, PRESS FINGERS TO BACK OF TONGUE TO INDUCE VOMITING. OBTAIN MEDICAL ATTENTION IN ALL CASES.

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Precautions for Safe Handling and Use

=====

Steps If Matl Released/Spill: TAKE UP W/ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE W/LOCAL, STATE, & FEDERAL REGULATIONS.
Precautions-Handling/Storing: STORE IN SEALED CONTAINER IN COOL, DRY LOCATION. USE ONLY IN WELL VENTILATED AREA.
Other Precautions: KEEP AWAY FROM OXIDIZERS & IGNITION SOURCES. AVOID EYE & SKIN CONTACT. AVOID BREATHING VAPORS.

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Control Measures

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Respiratory Protection: FACK MASK W/ORGANIC VAPOR CANISTER
Ventilation: RECOMMENDED
Protective Gloves: RUBBER
Eye Protection: PROTECTIVE GLASSES

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Transportation Data

Disposal Data

Label Data

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Label Required: YES
Technical Review Date: 12AUG92
Label Date: 24JUL92

=====

Label Status: F
Common Name: 4-BROMOFLUOROBENZENE 1ML
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: INHALATION: HARMFUL, HEADACHE, & NAUSEA.
INGESTION: GASTROINTESTINAL DISTURBANCES, BLINDNESS OR FATAL.
NEUROTOXIN/NEPHROTOXIN/TERATOGEN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INCORPORATED
Label Street: SUPELCO PARK
Label City: BELLEFONTE
Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: (814) 359-3441
Year Procured: UNK

=====

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DOW CHEMICAL U S A -- CARBON TETRACHLORIDE, TECHNICAL - CARBON TETRACHLORIDE, TECHNICAL
MATERIAL SAFETY DATA SHEET

FSC: 6810

NIIN: 001844799

Manufacturer's CAGE: 96717

Part No. Indicator: A

Part Number/Trade Name: CARBON TETRACHLORIDE, TECHNICAL

=====

General Information

=====

Item Name: CARBON TETRACHLORIDE, TECHNICAL

Company's Name: DOW CHEMICAL, U.S.A.

Company's Street: 2020 DOW CENTER

Company's City: MIDLAND

Company's State: MI

Company's Country: US

Company's Zip Code: 48640-6030

Record No. For Safety Entry: 002

Tot Safety Entries This Stk#: 002

Date MSDS Prepared: 01JAN85

Safety Data Review Date: 08NOV83

Supply Item Manager: CX

MSDS Serial Number: BDGXY

Hazard Characteristic Code: T6

Unit Of Issue: CN

Unit Of Issue Container Qty: 32 FLUID OZ

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Ingredients/Identity Information

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Proprietary: NO

Ingredient: CARBON TETRACHLORIDE (SARA III)

Ingredient Sequence Number: 01

Percent: 100

NIOSH (RTECS) Number: FG4900000

CAS Number: 56-23-5

OSHA PEL: 10 PPM

ACGIH TLV: S, 5PPM/10 STEL, A3 93

=====

Physical/Chemical Characteristics

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Appearance And Odor: CLEAR WATER-WHITE AROMATIC LIQUID

Boiling Point: 170F

Vapor Pressure (MM Hg/70 F): 91

Vapor Density (Air=1): 5.31

Specific Gravity: 1.5890

Solubility In Water: 0.08%

Percent Volatiles By Volume: 100

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Fire and Explosion Hazard Data

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Flash Point: N/A

Lower Explosive Limit: N/A

Upper Explosive Limit: N/A

Extinguishing Media: NOT APPLICABLE

Special Fire Fighting Proc: NOT APPLICABLE

Unusual Fire And Expl Hazrds: MATERIAL FORMS POISONOUS PHOSGENE GAS WHEN EXPOSED TO FLAMES.

=====

Reactivity Data

=====

Stability: YES

Cond To Avoid (Stability): OPEN FLAMES & WELDING ARCS CAN PRODUCE CHLORINE & PHOSGENE

Materials To Avoid: OXIDIZING MATERIAL
Hazardous Decomp Products: PHOSGENE, CHLORINE
Hazardous Poly Occur: NO

=====

Health Hazard Data

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Signs/Symptoms Of Overexp: LIVER DAMG, DIZZINESS, INCOORDINATION, MAYBE
NAUSEA, KIDNEY DAMG, DECREASES URINE. SUSPECTED CARCINOGEN-MAN
Emergency/First Aid Proc: EYES/SKIN: FLUSH W/ PENTY WATER. FOR EYES: GET
DR. REMOVE CONTAMINATED CLOTHES & WASH BEFORE REUSE. INHAL: MOVE TO FRESH AIR.
KEEP WARM & QUIET & GET DR. QUICKLY. INGEST: INDUCE VOMITING & GET DR.

=====

Precautions for Safe Handling and Use

=====

Steps If Matl Released/Spill: REMOVE UNNECESSARY PERSONNEL & CLEAN UP ALL
SPILLS IN ENCLOSED AREA PROMPTLY. MOP UP SPILL OR FLUSH FROM AREA WITH
WATER. PROVIDE PROTECTIVE EQUIPMENT.
Waste Disposal Method: SMALL AMOUNTS CAN BE POURED ON SAND, ETC, IN OPEN
ALLOWED TO EVAPORATE. LARGE AMOUNTS MAY BE INCINERATED WHEN MIXED WITH
FLAMMABLE LIQUID. WATER SCRIBBER OR INCINERATOR STACK IS REQUIRED.
Precautions-Handling/Storing: AVOID PITS, DEPRESSIONS, BASEMENTS STONG
CONSIDERATION SHOULD BE GIVEN TO AIR MONITORING SYSTEM WHERE MATERIAL IS
STORED & HANDLED ROUTINELY.
Other Precautions: GROSS AMTS, INCLUDING CONTAMINATED CLOTHING SHOULD BE
REMOVED FROM SKIN, AS SOON AS POSSIBLE. AVOID EYE & PROLONGED OR REPEATED
SKIN CONTACT. DO NOT BREATHE VAPORS.

=====

Control Measures

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Respiratory Protection: SELF-CONTAINED BREATHING APPARATUS FOR EXPOSURE > 10
PPM T 2 1/2 HR
Ventilation: DOWN DRAFT EXHAUST VENTILATION. AVOID USE IN BLDGS W/ PITS.
Protective Gloves: NEOPRENE OR PVC
Eye Protection: SAFETY GLASSES
Other Protective Equipment: FULL PROTECTIVE CLOTHING, SAFETY SHOWER, EYE
WASH STATION

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Transportation Data

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Trans Data Review Date: 83312
DOT PSN Code: CVY
DOT Proper Shipping Name: CARBON TETRACHLORIDE
DOT Class: 6.1
DOT ID Number: UN1846
DOT Pack Group: II
DOT Label: POISON
IMO PSN Code: DPR
IMO Proper Shipping Name: CARBON TETRACHLORIDE
IMO Regulations Page Number: 6096
IMO UN Number: 1846
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA UN ID Number: 1846
IATA Proper Shipping Name: CARBON TETRACHLORIDE
IATA Label: POISON
AFI PSN Code: FKO
AFI Prop. Shipping Name: CARBON TETRACHLORIDE
AFI Class: 6.1
AFI ID Number: UN1846
AFI Pack Group: II
AFI Label: POISON
AFI Special Prov: N36
AFI Basic Pac Ref: 10-9

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Disposal Data

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Disposal Data Review Date: 88228
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE,
CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U211
1st EPA Haz Wst Name New: CARBON TETRACHLORIDE; TETRACHLOROMETHANE
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
Label Status: F
Special Hazard Precautions: POISONOUS; MAY BE FATAL IF INHALED, SWALLOWED
OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. RUNOFF
FROM FIRE CONTROL OR DILUTION WATER MAY GIVE OFF POISONOUS GASES AND CAUSE
WATER POLLUTION. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES.
Label Name: DOW CHEMICAL U S A GOVERNMENT MARKETING
Label Street: 2020 DOW CENTER
Label City: MIDLAND
Label State: MI
Label Zip Code: 48640-6030
Label Country: US

=====

URL for this msds <http://hazard.com>. If you wish to change, add to, or
delete information in this archive please sent updates to dan@hazard.com.

MSDS for TETRACHLOROETHYLENEPage 1

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TETRACHLOROETHYLENE
FORMULA: CL₂C:CCl₂
FORMULA WT: 165.83
CAS NO.: 00127-18-4
NIOSH/RTECS NO.: KX3850000
COMMON SYNONYMS: PERCHLOROETHYLENE; ETHYLENE TETRACHLORIDE; CARBON BICHLORIDE;
CARBON DICHLORIDE
PRODUCT CODES: 9218, 9453, 5380, 9465
EFFECTIVE: 02/12/87
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (CANCER CAUSING)
FLAMMABILITY - 0 NONE
REACTIVITY - 0 NONE
CONTACT - 3 SEVERE (LIFE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

DANGER

HARMFUL IF SWALLOWED OR INHALED

EXCEPTIONAL HEALTH AND CONTACT HAZARDS - READ MATERIAL SAFETY DATA SHEET

NOTE: REPORTED AS CAUSING CANCER IN LABORATORY ANIMALS. EXERCISE DUE CARE.

NOTE: THIS MATERIAL OR ITS VAPORS IN CONTACT WITH FLAMES OR HOT GLOWING

SURFACES MAY FORM CORROSIVE ACID FUMES.

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE
VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TETRACHLOROETHYLENE	90-100	127-18-4

3 - PHYSICAL DATA

BOILING POINT: 121 C (250 F) VAPOR PRESSURE (MM HG): 13

MSDS for TETRACHLOROETHYLENEPage 2

MELTING POINT: -22 C (-8 F) VAPOR DENSITY(AIR=1): 5.8
SPECIFIC GRAVITY: 1.62 EVAPORATION RATE: 2.80
(H2O=1) (BUTYL ACETATE=1)
SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100
APPEARANCE & ODOR: COLORLESS LIQUID WITH ETHER OR CHLOROFORM ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 2-0-0

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.

TOXIC GASES PRODUCED

HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 300 PPM FOR 5 MINUTES IN ANY 3 HOURS. (PEL) CEILING = 200 PPM

THRESHOLD LIMIT VALUE (TLV/TWA): 335 MG/M3 (50 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 1340 MG/M3 (200 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (100 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 8850
LD50 (IPR-MOUSE) (MG/KG) - 4700

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS. LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.

MSDS for TETRACHLOROETHYLENE

Page 3

INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE DAMAGE TO KIDNEYS, LIVER,

LUNGS, BLOOD, OR CENTRAL NERVOUS SYSTEM.

TARGET ORGANS

LIVER, KIDNEYS, EYES, UPPER RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

SOME EXPERIMENTS WITH TEST ANIMALS INDICATED THAT THIS SUBSTANCE MAY BE ANTICIPATED TO BE A CARCINOGEN.

6 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, ALKALI METALS, ALUMINUM

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, PHOSGENE,
CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS.

TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER:

U210 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

MSDS for TETRACHLOROETHYLENE

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VENTILATION:

USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE

CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 50 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.
STORE IN A COOL, WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, FLAME, OR IGNITION.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TETRACHLOROETHYLENE (AIR ONLY)
HAZARD CLASS	ORM-A
UN/NA	UN1897
LABELS	NONE
REPORTABLE QUANTITY	1 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TETRACHLOROETHYLENE
HAZARD CLASS	6.1
UN/NA	UN1897
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

MSDS for TRICHLOROETHYLENEPage 1

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TRICHLOROETHYLENE
FORMULA: C₂HCL₃
FORMULA WT: 131.40
CAS NO.: 79-01-6
NIOSH/RTECS NO.: KX4550000
COMMON SYNONYMS: TRICHLOROETHENE; ETHINYL TRICHLORIDE; ACETYLENE TRICHLORIDE;
TCE
PRODUCT CODES: 5376, 9458, 9454, 9455, 9464, 9473
EFFECTIVE: 01/22/87
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 3 SEVERE (CANCER CAUSING)
FLAMMABILITY - 1 SLIGHT
REACTIVITY - 1 SLIGHT
CONTACT - 1 SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

WARNING

HARMFUL IF SWALLOWED OR INHALED
CAUSES IRRITATIONNOTE: THIS MATERIAL OR ITS VAPORS IN CONTACT WITH FLAMES OR HOT GLOWING
SURFACES MAY FORM CORROSIVE ACID FUMES.

NOTE: REPORTED AS CAUSING CANCER IN LABORATORY ANIMALS. EXERCISE DUE CARE.
AVOID CONTACT WITH EYES, SKIN, CLOTHING.
DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE
VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TRICHLOROETHYLENE	90-100	79-01-6

3 - PHYSICAL DATA

BOILING POINT: 87 C (189 F) VAPOR PRESSURE (MM HG): 58

MSDS for TRICHLOROETHYLENEPage 2

MELTING POINT: -73 C (-99 F) VAPOR DENSITY (AIR=1): 4.53
SPECIFIC GRAVITY: 1.47 EVAPORATION RATE: N/A
(H2O=1) (BUTYL ACETATE=1)
SOLUBILITY (H2O): SLIGHT (0.1 TO 1 %) % VOLATILES BY VOLUME: 100
APPEARANCE & ODOR: COLORLESS LIQUID WITH CHLOROFORM ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 2-1-0
FLAMMABLE LIMITS: UPPER - 10.5 % LOWER - 8.0 %
FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.
SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED
BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER
TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR.
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG
OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
HYDROGEN CHLORIDE, PHOSGENE, CHLORINE, CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

SOME EXPERIMENTS WITH TEST ANIMALS INDICATED THAT THIS SUBSTANCE MAY BE
ANTICIPATED TO BE A CARCINOGEN.

THRESHOLD LIMIT VALUE (TLV/TWA): 270 MG/M3 (50 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 1080 MG/M3 (200 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (100 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 7193
LD50 (IPR-MOUSE) (MG/KG) - 3000
LD50 (IV-MOUSE) (MG/KG) - 34

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,

MSDS for TRICHLOROETHYLENE

Page 3

DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE PULMONARY EDEMA.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.

PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,
GASTROINTESTINAL IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION AND
HEARING LOSS.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE DAMAGE TO KIDNEYS, LIVER,
LUNGS, BLOOD, OR CENTRAL NERVOUS SYSTEM.

TARGET ORGANS

RESPIRATORY SYSTEM, HEART, LIVER, KIDNEYS, CENTRAL NERVOUS SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT
LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN
EIGHT-HOUR SHIFT = 300 PPM FOR 5 MINUTES IN ANY 2 HOURS. (PEL)
CEILING = 200 PPM.

6 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION, LIGHT

INCOMPATIBLES: CHEMICALLY ACTIVE METALS, STRONG BASES,
STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, PHOSGENE, CHLORINE,
CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS.

TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE
INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

MSDS for TRICHLOROETHYLENE

Page 4

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER:

U228 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, NEOPRENE GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TRICHLOROETHYLENE (AIR ONLY)
HAZARD CLASS	ORM-A
UN/NA	UN1710
LABELS	NONE
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TRICHLOROETHYLENE
HAZARD CLASS	6.1
UN/NA	UN1710
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

MSDS for XYLENESPage 1

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: XYLENES
FORMULA: C6H4(CH3)2
FORMULA WT: 106.17
CAS NO.: 1330-20-7
NIOSH/RTECS NO.: ZE2100000
COMMON SYNONYMS: DIMETHYLBENZENE; XYLOL
PRODUCT CODES: 9489, 9499, 5377, 9491, 9493, 9490, X516, 9492, 9516
EFFECTIVE: 09/11/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 0 NONE
CONTACT - 2 MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING

FLAMMABLE

CAUSES IRRITATION

HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH
ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE,
USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE.
FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
M-XYLENE	40-65	108-38-3
O-XYLENE	15-20	95-47-6
P-XYLENE	0-20	106-42-3
ETHYL BENZENE	15-25	100-41-4

3 - PHYSICAL DATA

MSDS for XYLENESPage 2

BOILING POINT: 137 C (279 F) VAPOR PRESSURE(MM HG): 5.1
MELTING POINT: -48 C (-54 F) VAPOR DENSITY(AIR=1): 3.7
SPECIFIC GRAVITY: 0.87 EVAPORATION RATE: 0.7
(H2O=1) (BUTYL ACETATE=1)
SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100
APPEARANCE & ODOR: COLORLESS LIQUID WITH SWEET PLEASANT ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 27 C (80 F) NFPA 704M RATING: 2-3-0
FLAMMABLE LIMITS: UPPER - 7.0 % LOWER - 1.1 %
FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED
BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER
TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK.
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG
OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 435 MG/M3 (100 PPM)
SHORT-TERM EXPOSURE LIMIT (STEL): 655 MG/M3 (150 PPM)
PERMISSIBLE EXPOSURE LIMIT (PEL): 435 MG/M3 (100 PPM)
TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 4300
LD50 (IPR-MOUSE) (MG/KG) - 1.6
LD50 (SCU-RAT) (MG/KG) - 1700

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO
EFFECTS OF OVEREXPOSURE

MSDS for XYLENES

Page 3

INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,
DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.

INHALATION OF VAPORS MAY CAUSE NARCOSIS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-
INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

CENTRAL NERVOUS SYSTEM, EYES, SKIN, GI TRACT, BLOOD, LIVER AND KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY

INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR
AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK
IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP
WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO
CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.
J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED
FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER:

U239 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

MSDS for XYLENES

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VENTILATION:

USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET
TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NITRILE GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	XYLENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	XYLENES
HAZARD CLASS	3.3
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID

MSDS for TOLUENE

Page 1

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TOLUENE
FORMULA: C₆H₅CH₃
FORMULA WT: 92.14
CAS NO.: 108-88-3
NIOSH/RTECS NO.: XS5250000
COMMON SYNONYMS: METHYLBENZENE; PHENYLMETHANE; TOLUOL
PRODUCT CODES: 9472, 9456, 9466, 9462, V963, 9351, 9460, 9457, 9459, 9336, 5375, 9461
EFFECTIVE: 09/08/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 2 MODERATE
FLAMMABILITY - 3 SEVERE (FLAMMABLE)
REACTIVITY - 0 NONE
CONTACT - 1 SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE

CAUSES IRRITATION

MAY BE FATAL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH
ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE,
USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE.
FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TOLUENE	90-100	108-88-3

3 - PHYSICAL DATA

BOILING POINT: 111 C (232 F) VAPOR PRESSURE (MM HG): 22

MSDS for TOLUENE

Page 2

MELTING POINT: -95 C (-139 F) VAPOR DENSITY (AIR=1): 3.2

SPECIFIC GRAVITY: 0.87 EVAPORATION RATE: 2.24
(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY (H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH BENZENE-LIKE ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 4 C (40 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.1 % LOWER - 1.2 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 500 PPM FOR 10 MINUTES. (PEL) CEILING = 300 PPM.

THRESHOLD LIMIT VALUE (TLV/TWA): 375 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 560 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (200 PPM)

TOXICITY:	LD50 (ORAL-RAT) (MG/KG)	-	5000
	LD50 (IPR-MOUSE) (MG/KG)	-	1.12
	LD50 (SKN-RABBIT) (G/KG)	-	14
	LC50 (INHL-MOUSE-8H) (PPM)	-	5320

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

MSDS for TOLUENE

Page 3

EFFECTS OF OVEREXPOSURE

INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS,

SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION.
INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, DIFFICULTY BREATHING,
OR UNCONSCIOUSNESS.

LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY
RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE HEADACHE, NAUSEA, VOMITING, GASTROINTESTINAL
IRRITATION, UNCONSCIOUSNESS, CONVULSIONS.

CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS

CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, ABSORPTION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR
AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.

WASH CLOTHING BEFORE RE-USE.

6 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, NITRIC ACID, SULFURIC ACID,
CHLORINE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK
IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP
WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO
CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED
FOR SPILLS OF THIS PRODUCT.

MSDS for TOLUENE

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DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER:

U220 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TOLUENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1294
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TOLUENE
HAZARD CLASS	3.2
UN/NA	UN1294
LABELS	FLAMMABLE LIQUID



MATERIAL SAFETY DATA SHEET

1,2-Dichloroethylene, 99%, mixture of isomers
97772

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: 1,2-Dichloroethylene, 99%, mixture of isomers

Acetylene
Company Identification: Acros Organics N.V.
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
540-59-0	1,2-Dichloroethylene		208-750-2

Hazard Symbols: XN F
Risk Phrases: 11 20 52/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless. Flash Point: 6 deg C.
Warning! Flammable liquid. Light sensitive. Air sensitive. Moisture sensitive. May be harmful if swallowed. May cause central nervous system depression. May cause eye and skin irritation. May cause respiratory and digestive tract irritation.
Target Organs: Central nervous system.

Potential Health Effects

Eye:
May cause eye irritation.
Skin:
May cause skin irritation.
Ingestion:
May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed.
Inhalation:
May cause respiratory tract irritation. May cause narcotic effects.
Chronic:
Not available.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid.

Skin:

Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Treat symptomatically and supportively.

****** SECTION 5 - FIRE FIGHTING MEASURES ********General Information:**

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:

Use water spray to cool fire-exposed containers. In case of fire, use water fog, dry chemical, carbon dioxide, or regular foam.

Autoignition Temperature: Not available.

Flash Point: 6 deg C (42.80 deg F)

NFPA Rating: health-2; flammability-3; reactivity-2

Explosion Limits, Lower: 5.6

Upper: 12.8

****** SECTION 6 - ACCIDENTAL RELEASE MEASURES ******

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition. Use a spark-proof tool.

****** SECTION 7 - HANDLING and STORAGE ********Handling:**

Wash thoroughly after handling. Use only in a well ventilated area. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

Storage:

Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

****** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ********Engineering Controls:**

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
---------------	-------	-------	-------------------

1,2-Dichloroethylen	200 ppm ; 793	200 ppm TWA; 790	200 ppm TWA; 790
e	mg/m3	mg/m3 TWA 1000	mg/m3 TWA
		ppm IDLH	

OSHA Vacated PELs:

1,2-Dichloroethylene:
200 ppm TWA; 790 mg/m3 TWA

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Liquid
Appearance: colourless
Odor: acrid odor
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 48 - 60 deg C @ 760.00mm Hg
Freezing/Melting Point: -57 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density: 1.2650g/cm3
Molecular Formula: C2H2Cl2
Molecular Weight: 96.94

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:

Stable under normal temperatures and pressures.

Conditions to Avoid:

Light, ignition sources, exposure to air, excess heat, exposure to moist air or water.

Incompatibilities with Other Materials:

Oxidizing agents, bases.

Hazardous Decomposition Products:

Hydrogen chloride, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:

CAS# 540-59-0: KV9360000

LD50/LC50:

CAS# 540-59-0: Oral, rat: LD50 = 770 mg/kg.

Carcinogenicity:

1,2-Dichloroethylene -

Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
 No data available.
Teratogenicity:
 No data available.
Reproductive Effects:
 No data available.
Neurotoxicity:
 No data available.
Mutagenicity:
 See actual entry in RTECS for complete information.
Other Studies:
 No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
 Not available.
Environmental Fate:
 Not available.
Physical/Chemical:
 Not available.
Other:
 Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: None listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
 Shipping Name: 1,2-DICHLOROETHYLENE
 Hazard Class: 3
 UN Number: 1150
 Packing Group: II
IMO
 Shipping Name: DICHLOROETHYLENE
 Hazard Class: 3.2
 UN Number: 1150
 Packing Group: II
IATA
 Shipping Name: 1,2-DICHLOROETHYLENE
 Hazard Class: 3
 UN Number: 1150
 Packing Group: II
RID/ADR
 Shipping Name: 1,2-DICHLOROETHYLENE
Dangerous Goods Code: 3(3B)
 UN Number: 1150
Canadian TDG
 No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL

TSCA

CAS# 540-59-0 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 540-59-0: Effective Date: March 11, 1994; Sunset Date: March 11,
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

SARA

Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
Section 313
This chemical is not at a high enough concentration to be reportable
under Section 313.
No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depleters.
This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous
Substances under the CWA.
None of the chemicals in this product are listed as Priority
Pollutants under the CWA.
CAS# 540-59-0 is listed as a Toxic Pollutant under the Clean Water
Act.

OSHA:

None of the chemicals in this product are considered highly hazardous
by OSHA.

STATE

1,2-Dichloroethylene can be found on the following state right to
know lists: California, New Jersey, Florida, Pennsylvania, Minnesota,
Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN F

Risk Phrases:

R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms; may cause
long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No
smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to
special instructions/Safety data sheets.

WGK (Water Danger/Protection)

CAS# 540-59-0: 2

Canada

None of the chemicals in this product are listed on the DSL/NDSL list.
WHMIS: Not available.
CAS# 540-59-0 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 540-59-0: OEL-AUSTRALIA:TWA 200 ppm (790 mg/m3). OEL-AUSTRIA:TW
A 200 ppm (790 mg/m3). OEL-BELGIUM:TWA 200 ppm (793 mg/m3). OEL-DENMAR

K:TWA 200 ppm (790 mg/m3). OEL-FINLAND:TWA 200 ppm (790 mg/m3);STEL 250 ppm (990 mg/m3). OEL-GERMANY:TWA 200 ppm (790 mg/m3). OEL-HUNGARY:TWA 80 mg/m3;STEL 160 mg/m3. OEL-JAPAN:TWA 150 ppm (590 mg/m3). OEL-THE NETHERLANDS:TWA 200 ppm (790 mg/m3). OEL-THE PHILIPPINES:TWA 200 ppm (790 mg/m3). OEL-POLAND:TWA 50 mg/m3. OEL-RUSSIA:TWA 150 ppm. OEL-IRELAND:TWA 200 ppm (790 mg/m3);STEL 400 ppm. OEL-TURKEY:TWA 200 ppm (790 mg/m3). OEL-UNITED KINGDOM:TWA 200 ppm (790 mg/m3);STEL 250 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

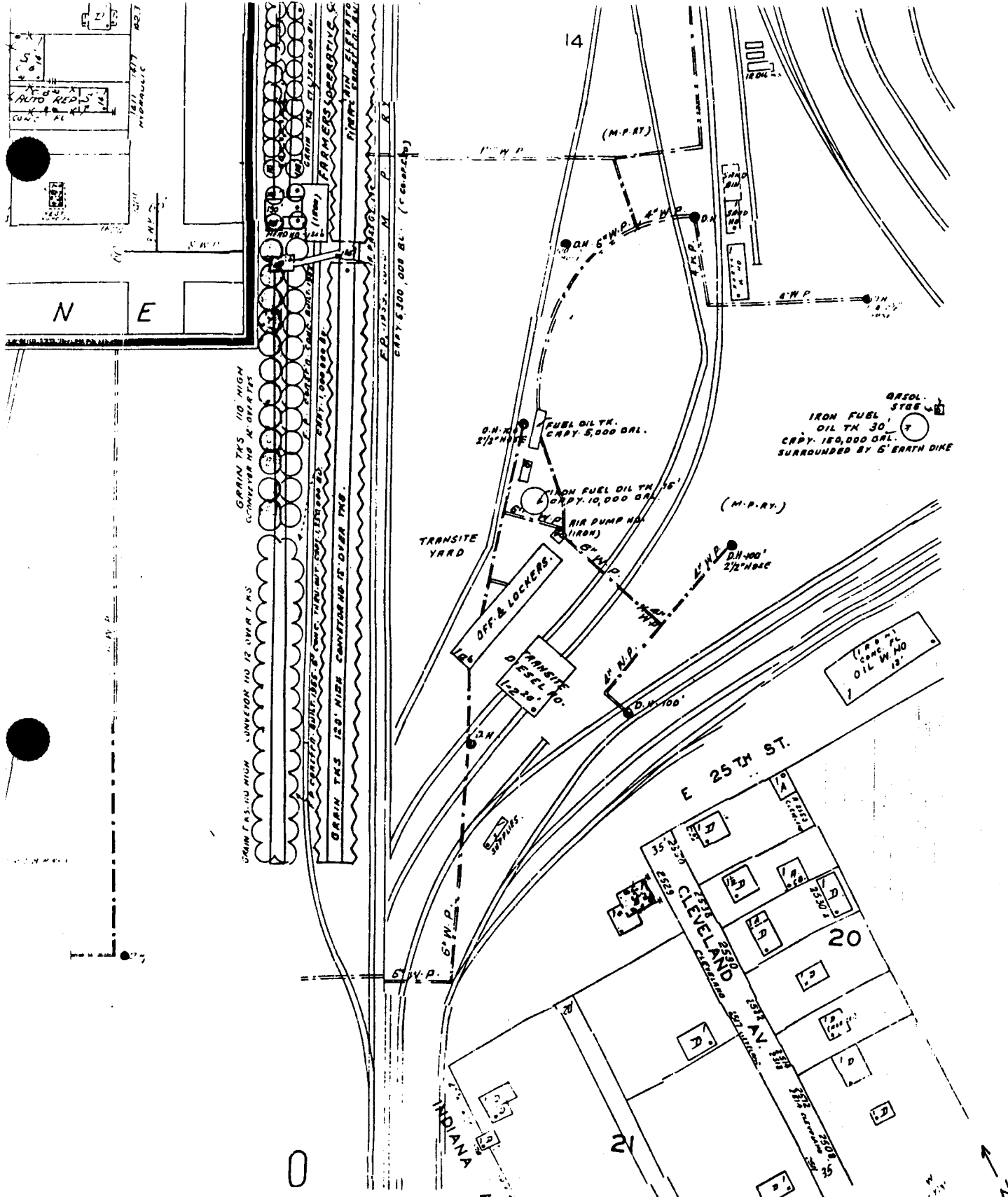
MSDS Creation Date: 10/17/1996 Revision #1 Date: 11/20/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

[Back to product information.](#)

APPENDIX B

Sanborn Maps



EDR Sanborn³, Inc.

This Sanborn[™] map is a certified copy produced by EDR Sanborn, Inc. from its archives. Information on this map is derived from Sanborn field surveys conducted in:

1964

EDR Sanborn, Inc.
EDR Sanborn, Inc. Research Associate

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1964

APPENDIX C
Aerial Photographs & Maps



1960 Aerial Photograph of Site Vicinity

S-K (Wichita) Facility

Reference: National Aerial Resources

Rensselaer Technology Park

385 Jordan Road

Troy, NY 12180

Scale 1"=2000', 9/13/60

No. 122F, 990030A



1970 Aerial Photograph of Site Vicinity

S-K (Wichita) Facility

Reference: National Aerial Resources

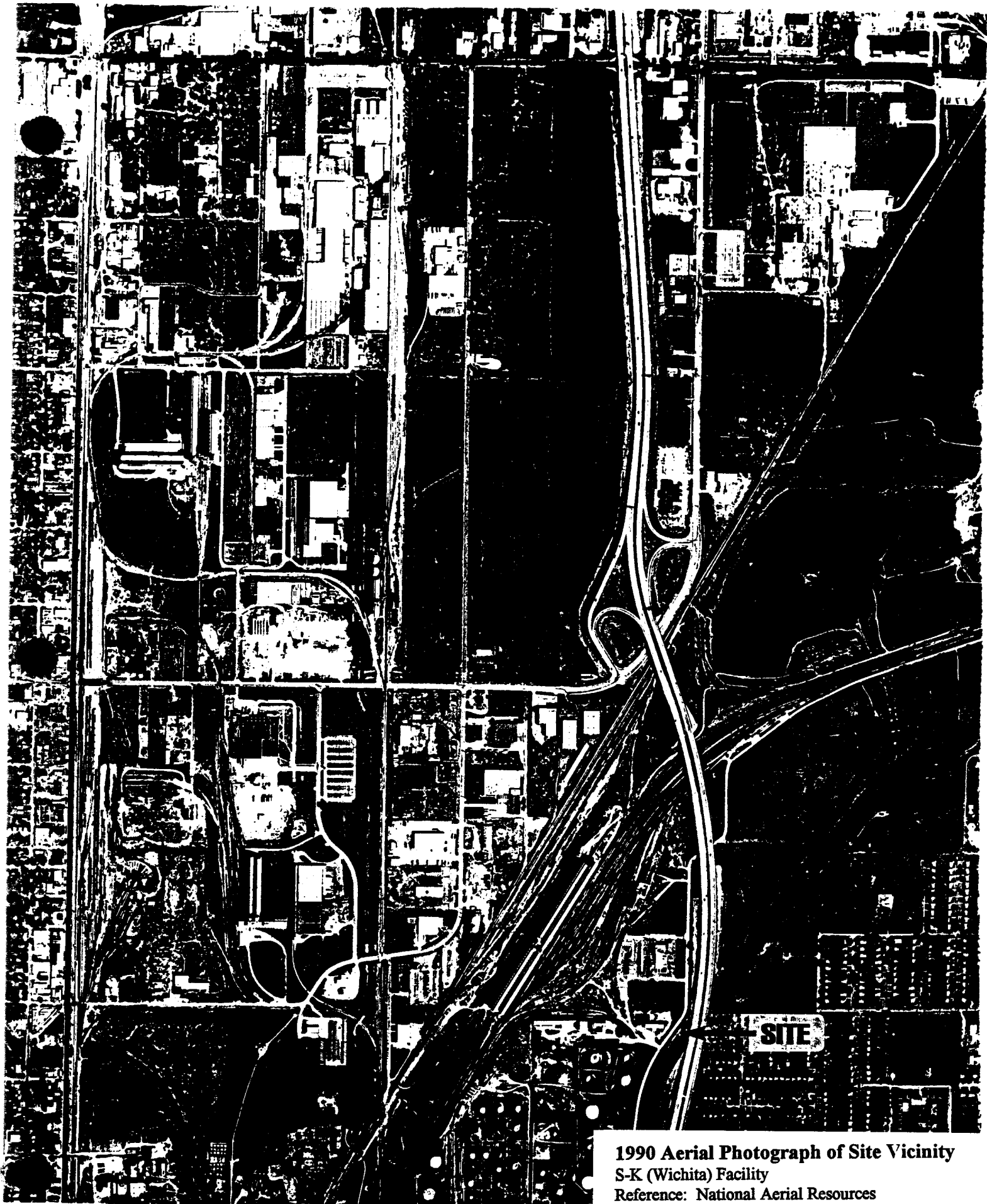
Rensselaer Technology Park

385 Jordan Road

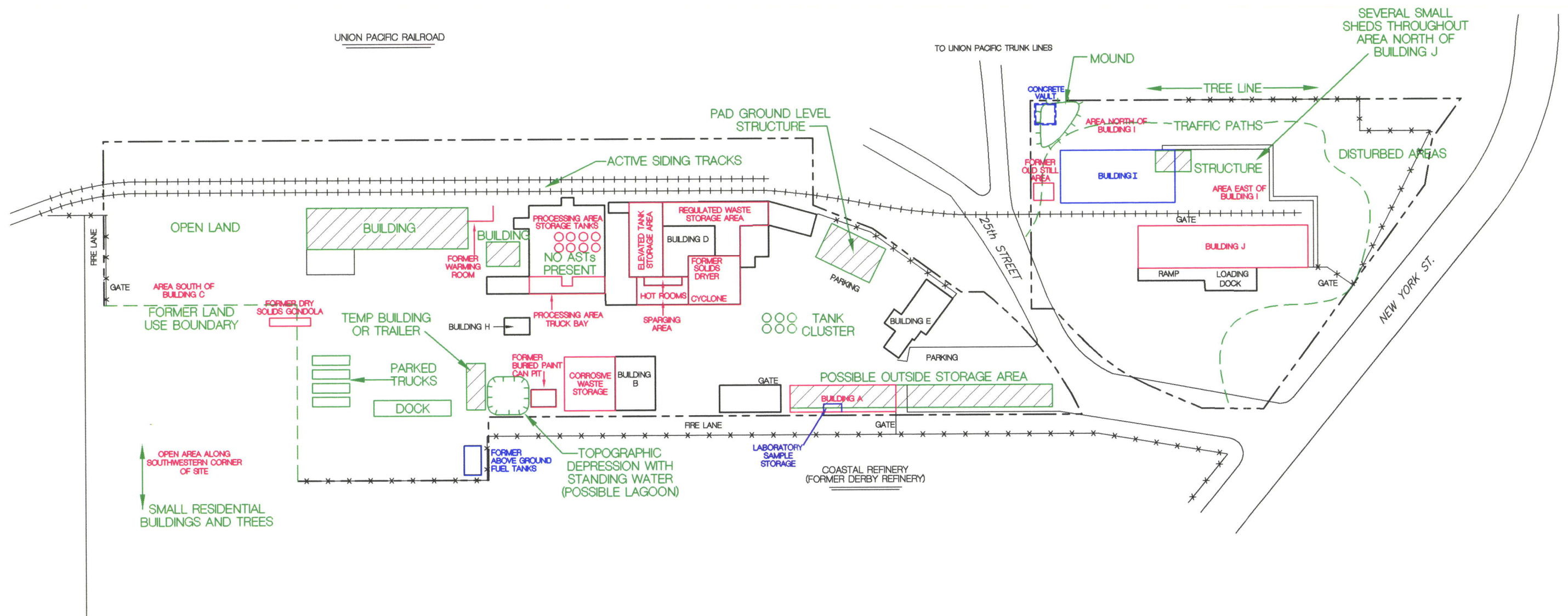
Troy, NY 12180

Scale 1"=2000', 12/1/70

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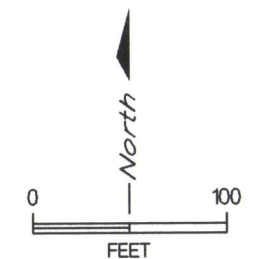


1990 Aerial Photograph of Site Vicinity
S-K (Wichita) Facility
Reference: National Aerial Resources
Rensselaer Technology Park
385 Jordan Road
Troy, NY 12180
Scale 1"=1000', 12/1/70
No. 122F, 990030A



NOTES: OBSERVATIONS FROM 1960 AERIAL PHOTO IN GREEN.
AREAS IN BLACK DENOTE NO OBSERVED CHANGE TO PRESENT SITE CONDITIONS.

□ : SWMU Locations
□ : AOC Locations



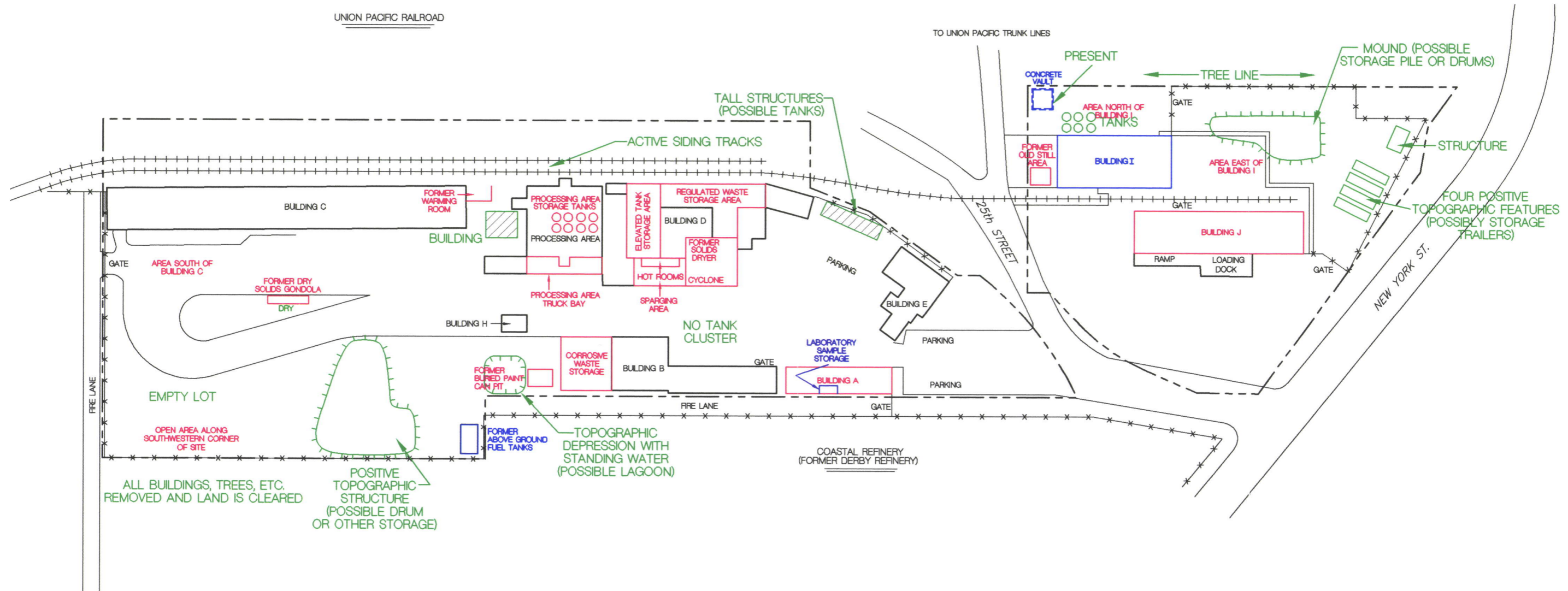
BY	DATE
DRAWN WRB	2/16/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	


**ENVIRONMENTAL
DECISION GROUP, INC.**
Innovative Services • Advanced Technology
A Safety-Kleen Company

SAFETY-KLEEN - WICHITA, KANSAS
AERIAL PHOTO INTERPRETATION (1960)
SITE BASE MAP

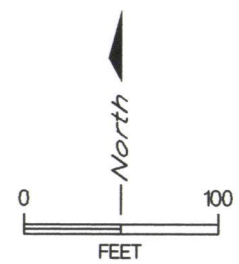
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DWG NO: 963231-0004



NOTES: OBSERVATIONS FROM 1970 AERIAL PHOTO IN GREEN.
AREAS IN BLACK DENOTE NO OBSERVED CHANGE TO PRESENT SITE CONDITIONS.

- : SWMU Locations
- : AOC Locations



BY	DATE
DRAWN WRB	2/23/99
CHECKED	
APPROVED	
APPROVED	



**ENVIRONMENTAL
DECISION GROUP, INC.**
Innovative Services • Advanced Technology
A Safety-Kleen Company

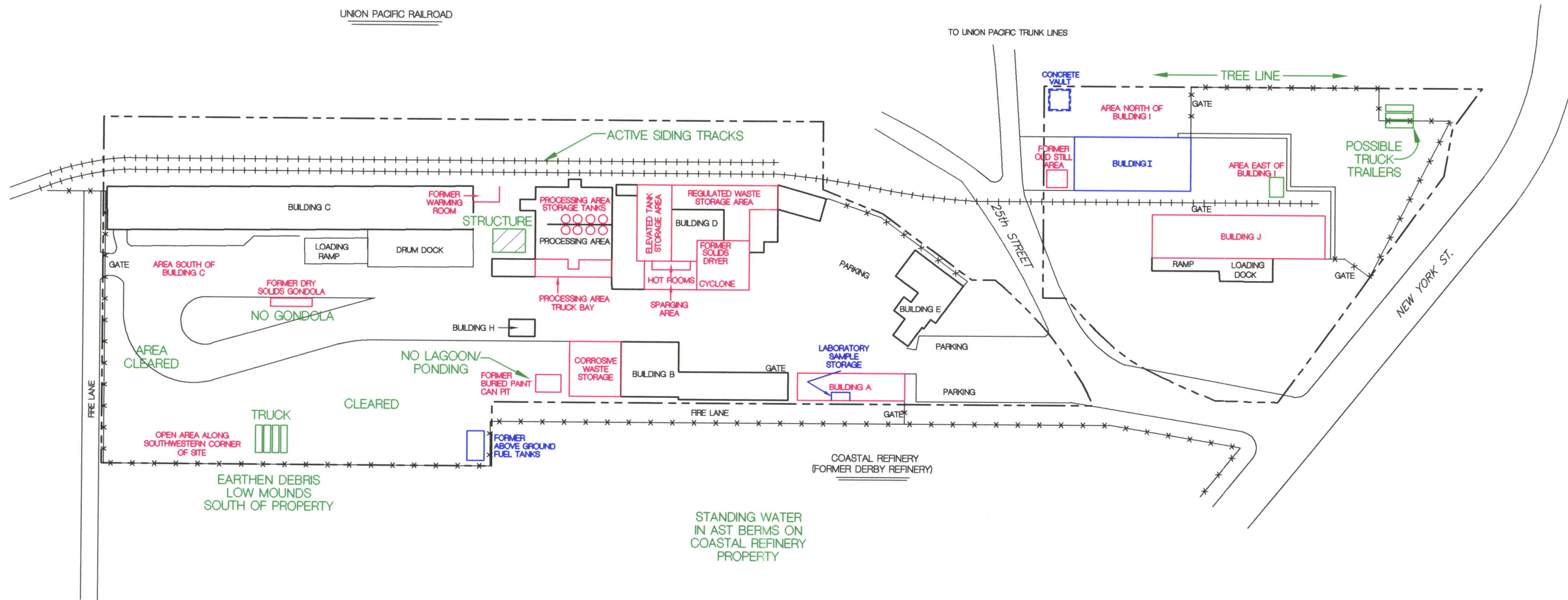
SAFETY-KLEEN - WICHITA, KANSAS

AERIAL PHOTO INTERPRETATION (1970)

SITE BASE MAP

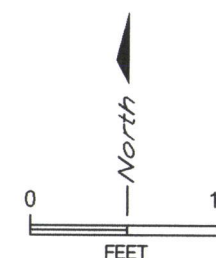
SCALE: 1" = 100'

DWG. NO: 963231-0003



NOTES: OBSERVATIONS FROM 1990 AERIAL PHOTO IN GREEN.
AREAS IN BLACK DENOTE NO OBSERVED CHANGE TO PRESENT SITE CONDITIONS.

□ : SWMU Locations
□ : AOC Locations



BY	DATE
DRAWN WRB	2/23/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	


**ENVIRONMENTAL
 DECISION GROUP, INC.**
Innovative Services • Advanced Technology
 A Safety-Kleen Company

SAFETY-KLEEN - WICHITA, KANSAS
AERIAL PHOTO INTERPRETATION (1990)
SITE BASE MAP

SCALE: 1" = 100'

DWG. NO: 963231-0002

APPENDIX D

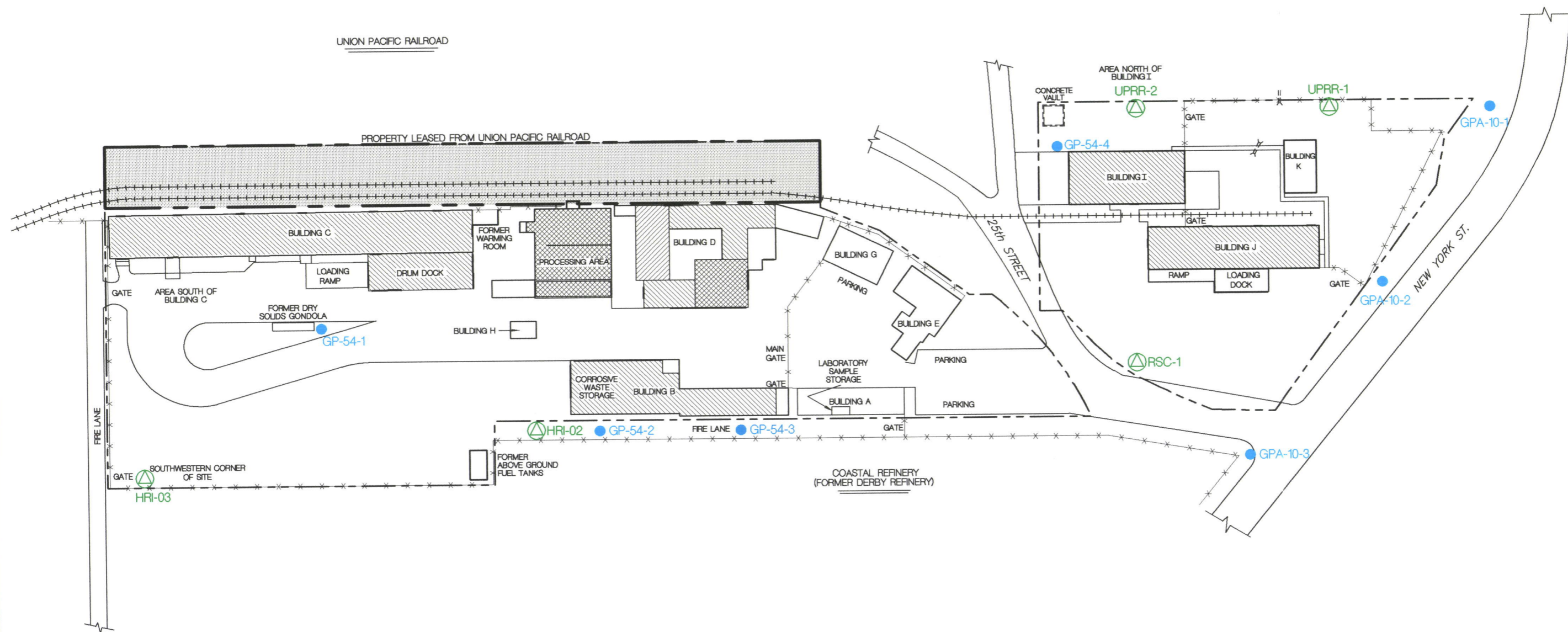
April 6, 1984	Notice of Violation from KDHE to RSC. Regarding inspection logs, emergency communication or alarm equipment, emergency response, many operational conditions and contingency plans.
June 22, 1984	KDHE News Release (newsletter) stating that RSC was assessed a \$7,000 fine by KDHE regarding violations of laws regulating the storage of hazardous waste. The violations were based upon an April 1984 site inspection by KDHE and the USEPA. The violation was partially due to the fact that 1300 drums were being stored on site at the time when only 500 are permitted for storage at any given time. It was also noted that drums were stored in deteriorated condition, resulting in leakage into the ground. Several violations of drum storage were cited. Corrections were required to be made prior to July 1, 1984.
December 31, 1980	County Department of Community Health memorandum to KDHE regarding a visit to the RSC facility in response to a RSC employee complaint about improper disposal of hazardous wastes. Memo references large propane tank in SW corner of site, cut in half and collecting paint sludge and rainwater. Observed paint sludge on ground around the vicinity of tank (an area of approx. 25 feet in diameter). KDHE instructed RSC to remediate the problem and find another way to handle the waste. The memo states that his next trip the waste and some soil were drummed from the cleanup of this problem area.
October 22, 1980	Documentation of anonymous caller to KDHE reporting that RSC was dumping drums of re-distilled solvents sludge/solution into a propane tank cut in half with holes in the bottom of it. Cleanup was conducted and confirmed on 11/20/80.
May 23, 1980	Recovery of Waste Solvent Flow Chart for site, including map showing where certain processes take place..
April 1980	Order for KDHE regarding the RSC's violations of Kansas permit requirements due to the handling/processing of radioactive waste, and other violations of its permit.
January 31, 1980	KDHE memo to RSC, Wichita File recording conversation with facility manager. The memo mentions a pilot study regarding a distilling process for solvents to create sludge. The sludge has been used for roofing and road materials. It also notes that they have drums piling up on site not being treated in rusty drums, although leakage was not noted.
April 11, 1978	KDHE letter to RSC regarding an inspection of the facility on April 4, 1978. The letter states that waste solvent and still bottom sludge are diverted under the fence into a small drainage channel adjacent to the property, that still bottom sludge is dumped on the roofs of the site buildings, and that the acid repackaging rinse water pit is discharged to the same drainage channel.
Undated Material	No known releases reported to KDHE (RSC)
Undated Material	Disclosure Statement directed to RSC president, C. Trombold, stating that in June of 1984, RSC was notified of two violations: 1) Over storage capacity; and 2) Leaking containers identified.

**Summary Table of Documents
KDHE File Search
S-K (Wichita) Facility
Wichita, Kansas**

<u>Date</u>	<u>Description of Document</u>
January 19, 1995	Memo from J.P. Goetz (KDHE) to other bureaus within KDHE (BOW, BWM, & BER) regarding monitoring of Chisolm Creek with respect to USPCI (S-K's current site) and Coastal Refinery. Reports quarterly water samples collected from Chisolm Creek had a range of volatile organic compounds (VOCs) and related daughter products present. According to the memo, concentrations of benzene and TCE exceeded the MCLs in one sample each. The sample collected closest to the S-K site, had chlorinated VOCs and related daughter products present, but not at concentrations exceeding MCLs. The memo suggests that this monitoring should be continued, possibly at Coastal or USPCI's (S-K's) expense, and requests information and feedback from the other divisions that the memo was directed to. Sample location map and analytical results are included with the memo.
May 6, 1994	Memo from J.P. Goetz (KDHE) to an individual in KDHE-BOW stating that six quarterly water samples were collected from Chisolm Creek up- and downgradient of the refinery and analyzed for inorganics and VOCs. One sample, collected downgradient of the refinery, exceeded the MCLs for TCE, benzene and tetrachloromethane. The area from which this sample (#3) was collected had the most visible oil sheen from seepage from the refinery on it. Hydrocarbon Recyclers, Inc. is mentioned as a possible source for the chlorinated VOC portion of the results.
August 6, 1993	Letter to USEPA from USPCI Facility Production Manager (currently the S-K facility) stating that they will proceed with the removal of identified buried paint cans from their facility that month. Also attached to this letter is a letter from R. Zora of USPCI to Region VII USEPA M. Matthews summarizing the discussions of a recent meeting between USPCI and USEPA regarding how to remediate the buried paint cans, and the status of other regulatory issues regarding the site.
September 21, 1992	Certification of Closure of Building F of the Hydrocarbon Recyclers, Inc. (currently the S-K facility) prepared and stamped by Reiss & Goodness Engineers of Wichita, Kansas.
May 27, 1992	Memo to R. Smith (affiliation uncertain) from Teresa Hansen (KDHE) regarding the area of "buried hazardous waste sludge located at Hydrocarbon Recyclers, Inc." (HRI). The sludge was reportedly discovered while excavating an area west of Building B. A schematic diagram is attached. The drawing indicates that the impacted area appears to be in the vicinity of, but separate from the buried paint can excavation. R. Robertson (S-K employee) was reportedly present during the KDHE site visit to inspect.
Winter 1992	Draft Trip Report by PRC Environmental Management, Inc. (PRC) documenting a soil gas survey conducted on behalf of the USEPA at the site in January 1992. Chlorinated and aromatic compounds were identified in the soil vapor.
December 5, 1991	Letter from USPCI to KDHE to transmit analytical results associated with closure of Building F.
October 8, 1991	Partial Closure Plan for Building F (container storage area) prepared by USPCI (HRI).
January 30, 1990	Letter from HRI to KDHE regarding the transmittal of a Business Concern Closure Statement for the site.

June 21, 1989	HRI Additional Information in a summarized format. This document discusses the facility hazardous waste storage tanks, a description of the handling procedures once hazardous wastes are received at the facility, the different storage and processing areas on site, wastestream channeling, a map, and photographs of the different areas.
February 16, 1989	Memorandum by the KDHE summarizing a site visit on February 15, 1989. It discusses the partial closure of the old blending tank area of the facility, and changes made to the facility.
September 15, 1988	Letter from HRI to KDHE regarding clarification of the site addresses and EPA identification numbers.
August 20, 1988	KDHE letter to HRI regarding the site inspection referenced in the memorandum dated July 2, 1987. The letter outlines the wastes generated on site and their waste codes, and non-compliance issues observed during the site inspection. Photos of the site inspection are included with the letter.
February 10, 1988	Memorandum by KDHE summarizing a site visit to inspect the closure of a cleaned hazardous waste tanker acting as a storage tank by the facility, and to check on the progress of HRI's Part B permit application.
November 4, 1987	KDHE record of conversation with HRI relaying new ownership status of facility and increased storage capacity and waste codes to waste stream. It also references HRI's proposed changes to the facility operations and/or existing structures.
August 4, 1987	KDHE letter to Conservation Services, Inc. (CSI) (current site) regarding an inspection of the TSD facility, the wastes and waste codes handled on site, items of non-compliance, and related issues.
July 2, 1987	KDHE RCRA compliance inspection report generators and transporters checklist, listing waste numbers, general information such as the number of waste customers, the types and treatments of wastes handled on site, field observations, and findings.
July 21, 1987	KDHE analytical results for soil samples collected adjacent to transformer south of Warehouse C(hand-drawn diagram included). Inorganics were only parameters to indicate concentrations present (possibly background concentrations, though.)
July 2, 1987	KDHE RCRA Inspection conducted to collect soil samples referenced above.
June 1, 1987	Letter from CSI to KDHE with monitoring well construction sheets and correlating ground water analytical results. Soil TCLP analyses also attached, but locations of the wells and soil samples are not specifically identified.
November 12, 1986	KDHE memo stating that sampling of wells on the northern edge of the Derby Refinery Property suggest that chlorinated solvents are migrating onto the refinery property from upgradient sources.
October 20, 1986	Letter from KDHE to CSI regarding a hazardous waste compliance inspection. The letter identifies the wastes generated on site and the associated waste codes, along with identified waste codes.
September 18, 1986	CSI additional information sheet (source unknown—but written as though it is based upon a site inspection by KDHE) and mentions the dry gondola, now recognized as a SWMU. Document states that the gondola is used for solidified gondola paint waste. The document mentions field observations made in the vicinity of the Warehouse C, staging area, still area, lab, sparging unit and warehouse area.
October 30, 1984	KDHE memorandum regarding a site inspection of the site when owned by Reid Supply Company (RSC). Primary objections of inspection were to assess progress that had been made at the facility and to discuss completion of their Part B permit application.
September 4, 1984	KDHE letter to RSC regarding inspections conducted as follow-ups to the April 5, 1984 RCRA inspection. Inspection reports were attached with comments.

APPENDIX E
Draft NIC Data Provided by CDM
&
Maps & Interpretation of Data conducted by EDG

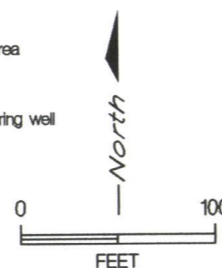


Building Legend

Building A	Laboratory/Administration
Building B	Hazardous Waste Management Building
Building C	Hazardous Waste Management Building
Building D	Hazardous Waste Management Building
Building E	Administration
Building G	Personnel Decon/Break Room
Building H	Operations Office
Building I	Hazardous Waste Management Building
Building J	Hazardous Waste Management Building
Building K	Mechanical Equipment Building
Processing Area	Hazardous Waste Management Area
Drum Dock	Hazardous Waste Management Area

Legend:

+++++	: Railroad Tracks
***	: Fence
---	: Property Line
	: Container Storage Area
	: Tank Storage Area
	: Container and Tank Storage Area
---	: Loading and Unloading Area
△	: Approximate location of monitoring well
●	: Geoprobe data point



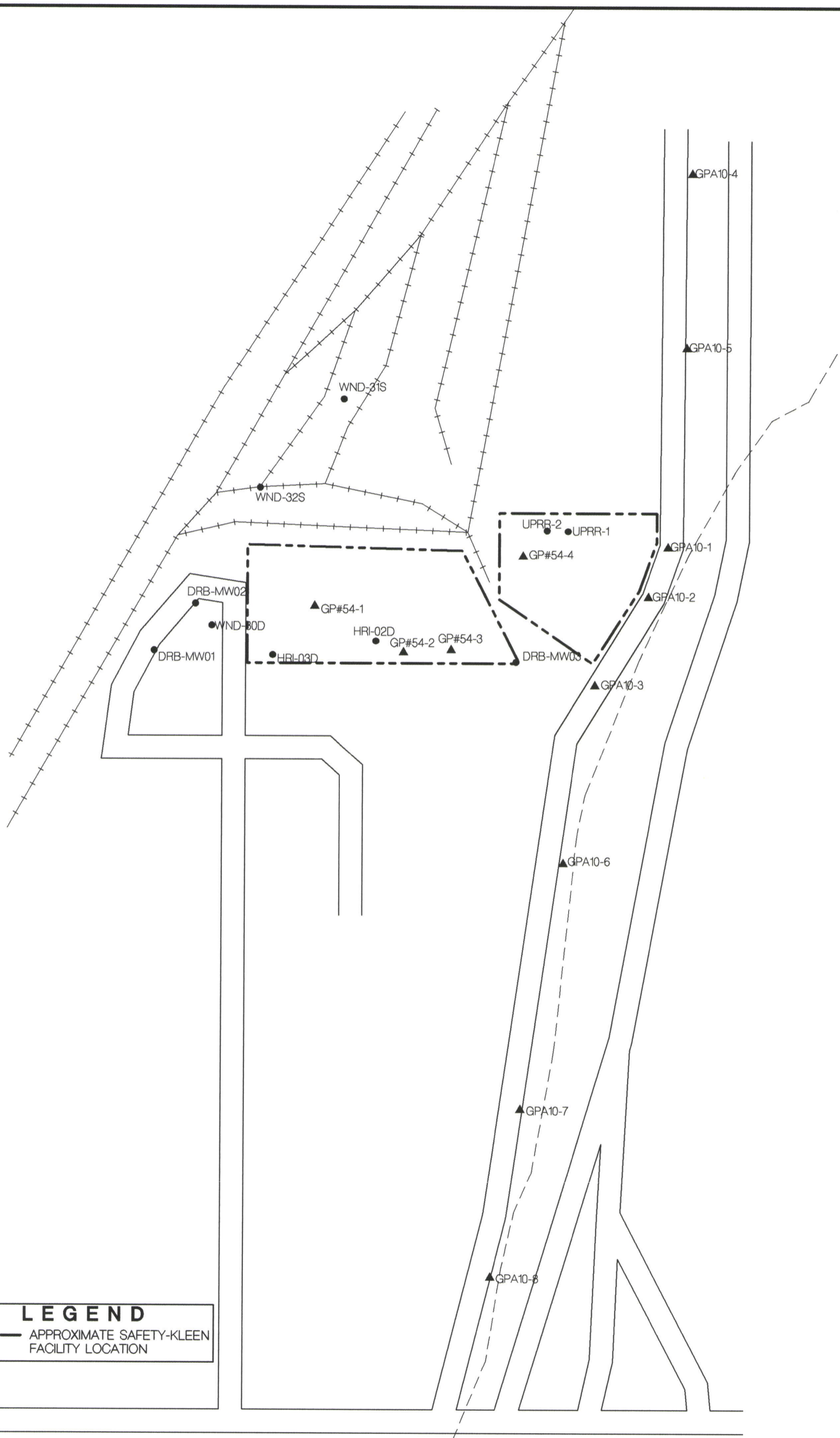
BY	DATE
DRAWN WRB	2/16/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	



SAFETY-KLEEN - WICHITA, KANSAS

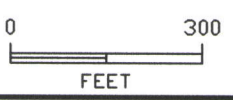
APPROXIMATE LOCATIONS OF NIC DATA POINTS AND EXISTING SITE MONITORING WELLS

SCALE:	1" = 100'	DWG NO:	963231-0008
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LEGEND

--- APPROXIMATE SAFETY-KLEEN FACILITY LOCATION



North

BY	DATE
DRAWN WRB	2/12/99
CHECKED	
APPROVED	
APPROVED	
APPROVED	



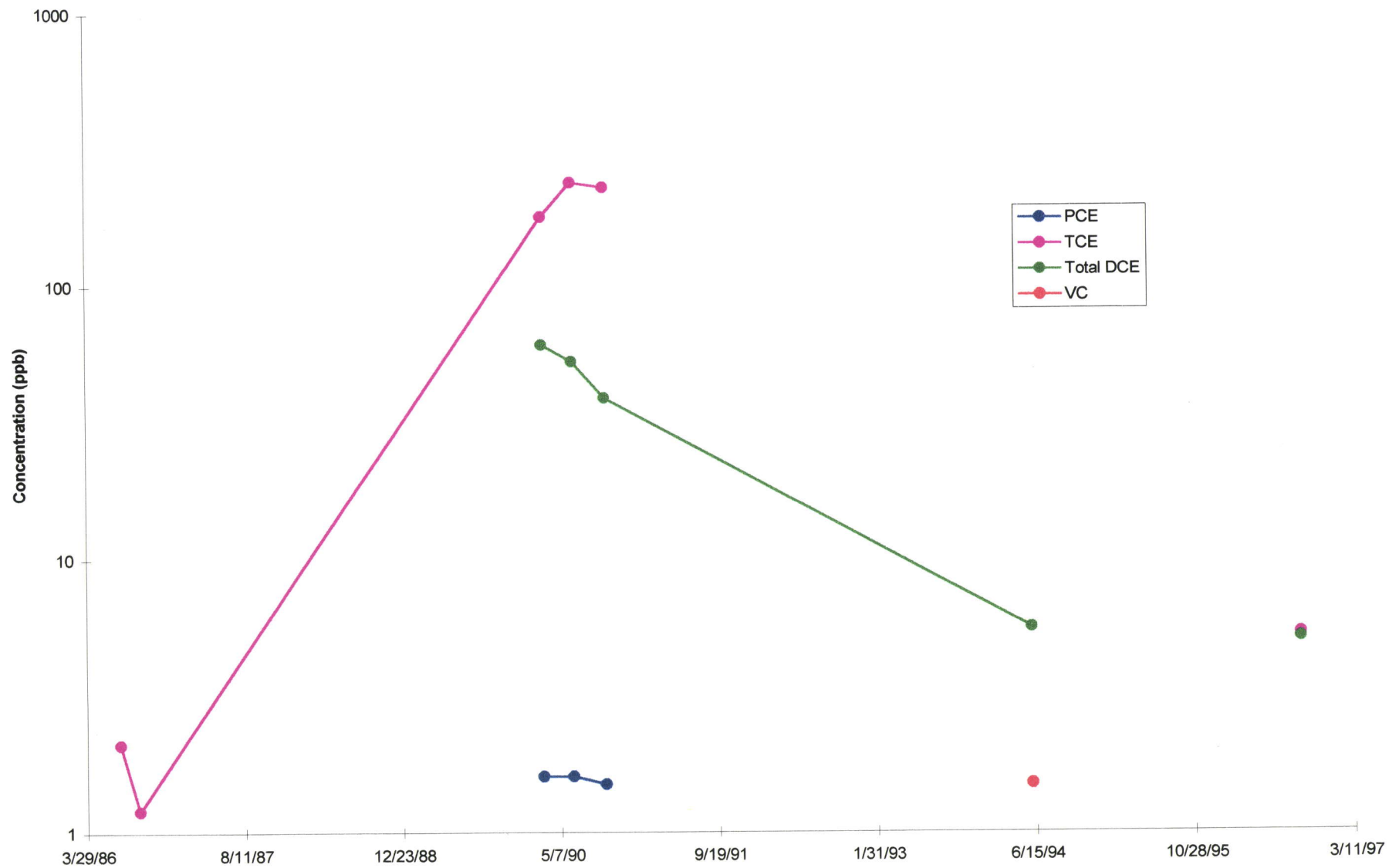
**ENVIRONMENTAL
DECISION GROUP, INC.**
Innovative Services • Advanced Technology
A Safety-Kleen Company

SAFETY-KLEEN FACILITY - WICHITA, KANSAS

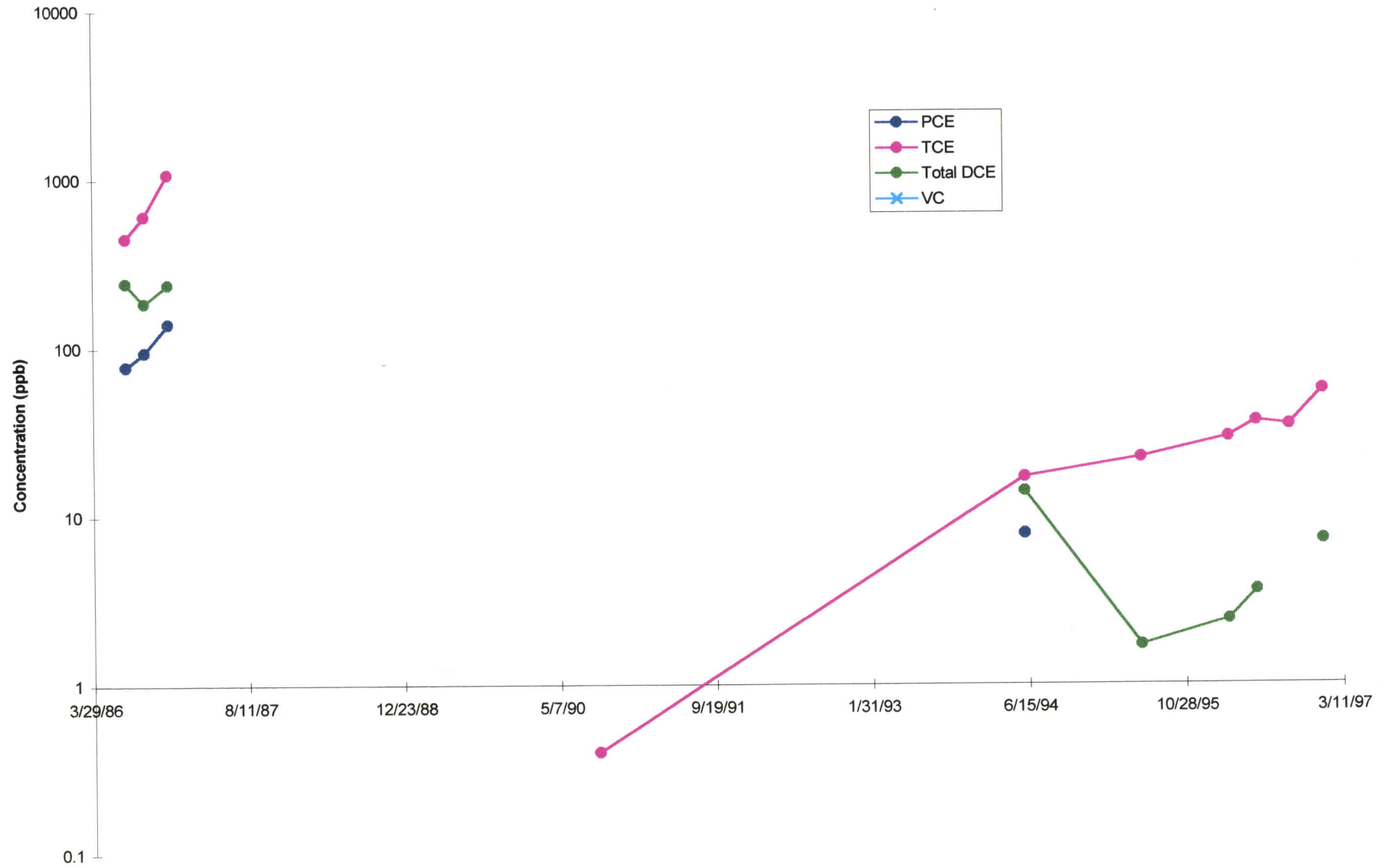
NIC DATA POINTS IN SITE VICINITY

SCALE:	1" = 300'	DWG. NO:	963231-0001
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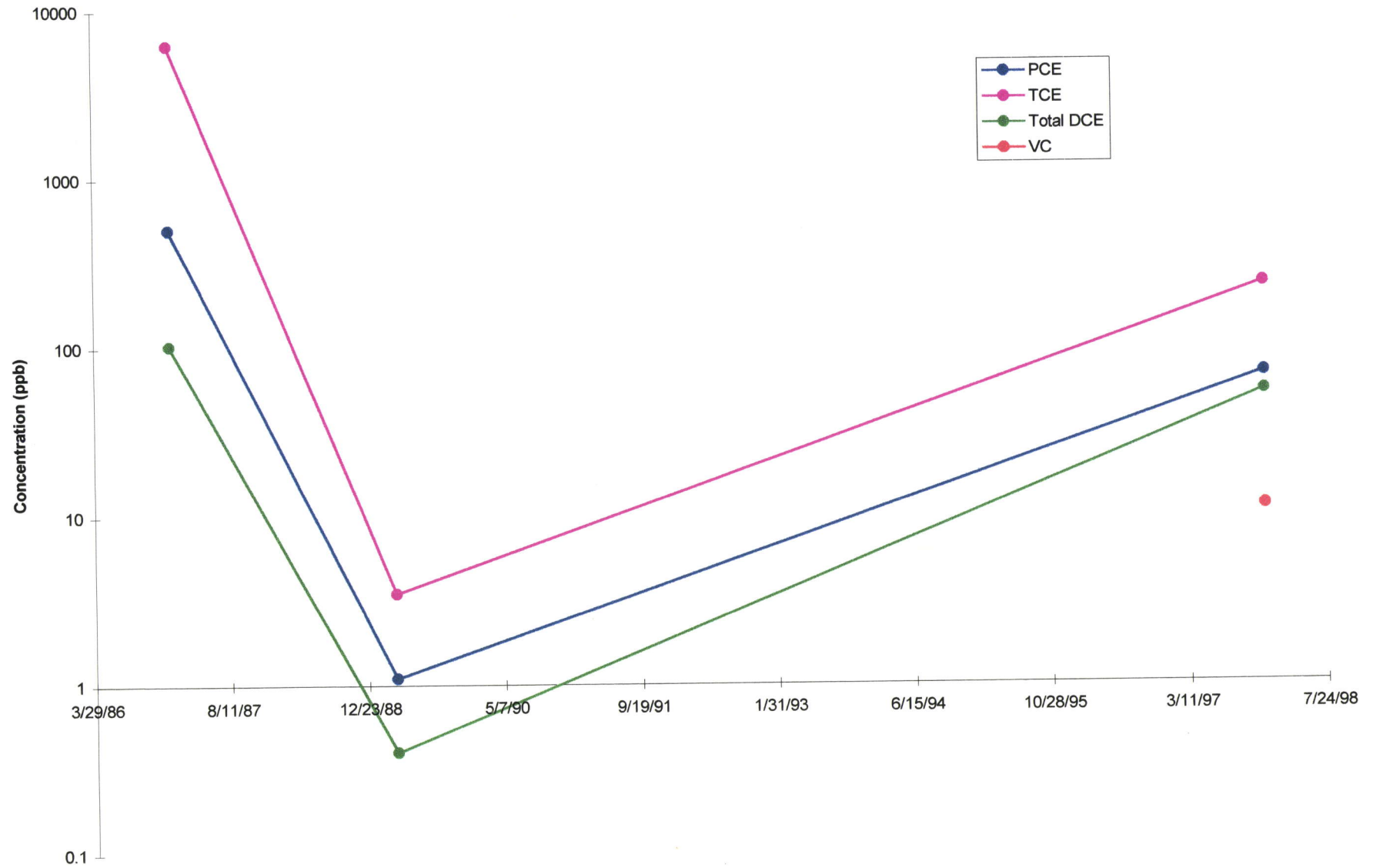
MW-01 VOC Data



MW-03 VOC Data



HRI-03D VOC Data



Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		7/12/86	1,1,1-Trichloroethane	0.6			ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,2-Dichloroethane	0.6			ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Trichloroethane	2.1			ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		7/12/86	Xylene (Total)		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,2-Dichloroethane	0.3			ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,3-Dichlorobenzene		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		9/9/86	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Benzene	0.3			ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Methylene chloride	0.2			ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Trichloroethene	1.2			ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/9/86	Xylene (Total)		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Barium	40			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Bromodichloromethane		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		3/12/90	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Cadmium	2			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Chromium		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Lead		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Oil & grease	4100			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Tetrachloroethene	1.6			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	trans-1,2-Dichloroethene	61			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Trichloroethene	180			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/90	Xylene (Total)		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	4-Isopropyltoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Barium	70			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Benzene	0.2			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Bromodichloromethane		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		6/14/90	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Cadmium		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Chloroform	4.1			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Chromium		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Ethylbenzene	0.4			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Lead		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Oil & grease		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Tetrachloroethene	1.6			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Toluene	0.4			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	trans-1,2-Dichloroethene	53			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Trichloroethene	240			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Xylene (Total)	1.3			ug/L	GW
DRB-MW01	DRB-MW01	S		6/14/90	Zinc		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Barium	40			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Benzene	0.3			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Bromodichloromethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		9/25/90	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Cadmium		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Chloroform	1.7			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Chromium	21			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Ethylbenzene	0.4			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Iron		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Methylene chloride	2			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Oil & grease		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Tetrachloroethene	1.5			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Toluene	0.6			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	trans-1,2-Dichloroethene	39			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Trichloroethene	230			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/90	Xylene (Total)	1.3			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1-Dichloroethane	2.8			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,1-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2,4-Trimethylbenzene	9.2			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2-Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2-Dichloroethane	69			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,2-Dichloropropane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		5/31/94	1,3,5-Trimethylbenzene	2.6			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,3-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	2,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	2-Chlorotoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	4-Chloroaniline		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	4-Isopropyltoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Arsenic	23			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Bromobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Bromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Bromodichloromethane	3.7			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Chloroform	5.6			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Chromium	75			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	cis-1,2-Dichloroethene	5.6			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Dibromochloromethane	1.2			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Ethylbenzene	14			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Hexachlorobutadiene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Isopropylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Lead	160			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	m,p-Xylene	43			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Naphthalene	6.6			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	n-Butylbenzene	1			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	n-Propylbenzene	1.4			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	o-Xylene	13			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	pH	7.4			SU	GW
DRB-MW01	DRB-MW01	S		5/31/94	sec-Butylbenzene	2.4			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Specific Conductance	2.2			umHOS/cm	GW
DRB-MW01	DRB-MW01	S		5/31/94	Styrene		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		5/31/94	tert-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Toluene	11			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Vinyl chloride	1.5			ug/L	GW
DRB-MW01	DRB-MW01	S		5/31/94	Xylene (Total)	56			ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,1-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2-Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,3-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	2,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	2-Chlorotoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	4-Chloroaniline		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	4-Isopropyltoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Bromobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Bromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Bromomethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		6/7/95	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Chromium		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	cis-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Hexachlorobutadiene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Isopropylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Lead		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	m,p-Xylene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Naphthalene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	n-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	n-Propylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	o-Xylene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	sec-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Styrene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	tert-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/7/95	Xylene (Total)		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Benzene	1			ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Chromium	77.9			ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Ethylbenzene	1.4			ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		8/22/95	Lead	17			ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		8/22/95	Xylene (Total)	6.1			ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Arsenic	15			ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Chromium	111			ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Lead	14.8			ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	pH	7.4			SU	GW
DRB-MW01	DRB-MW01	S		12/11/95	Toluene	1.6			ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		12/11/95	Xylene (Total)	5.6			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,1-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2-Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,3-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	2,2-Dichloropropane		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		3/12/96	2-Chlorotoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	4-Chloroaniline		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	4-Isopropyltoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Arsenic	7			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Benzene	0.6			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Bromobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Bromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Chromium	64.9			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	cis-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Ethylbenzene	0.6			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Hexachlorobutadiene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Isopropylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Lead	40.4			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	m,p-Xylene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Naphthalene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	n-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	n-Propylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	o-Xylene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	pH	6.9			SU	GW
DRB-MW01	DRB-MW01	S		3/12/96	sec-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Specific Conductance	4340			umHOS/cm	GW
DRB-MW01	DRB-MW01	S		3/12/96	Styrene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	tert-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Toluene	0.6			ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	trans-1,3-Dichloropropene		U		ug/L	GW

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Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		3/12/96	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		3/12/96	Xylene (Total)	2.2			ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,1-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2-Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,3-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	2,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	2-Chlorotoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	4-Chloroaniline		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Bromobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Bromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Chromium	9.18			ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		6/10/96	cis-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Hexachlorobutadiene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Isopropylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Lead	12.5			ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Naphthalene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	n-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	n-Propylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	sec-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Styrene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	tert-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		6/10/96	Xylene (Total)		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,1-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	4-Isopropyltoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Arsenic		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Bromomethane		U		ug/L	GW

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Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		9/25/96	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Chromium	35.9			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Lead	14.9			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Methylene chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	trans-1,2-Dichloroethene	5.1			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Trichloroethene	5.3			ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		9/25/96	Xylene (Total)		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,1-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2-Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2-Dichloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,2-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,3-Dichloropropane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	2-Chlorotoluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	4-Chloroaniline		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Arsenic		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW01	DRB-MW01	S		1/7/97	Benzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Bromobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Bromodichloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Bromoform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Bromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Carbon Tetrachloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Chlorobenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Chloroethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Chloroform		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Chloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Chromium	9.45			ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	cis-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Dibromochloromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Dibromomethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Ethylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Hexachlorobutadiene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Lead	21.4			ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Methylene chloride	3.4			ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Naphthalene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	n-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	n-Propylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	pH	6.4			SU	GW
DRB-MW01	DRB-MW01	S		1/7/97	sec-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Specific Conductance	2930			umHOS/cm	GW
DRB-MW01	DRB-MW01	S		1/7/97	Styrene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	tert-Butylbenzene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Tetrachloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Toluene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Trichloroethene		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Trichlorofluoromethane		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Vinyl chloride		U		ug/L	GW
DRB-MW01	DRB-MW01	S		1/7/97	Xylene (Total)		U		ug/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Antimony		U		mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Arsenic		U		mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Barium	0.05			mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Cadmium		U		mg/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW02	DRB-MW02	S		7/1/90	Chromium		U		mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Iron	0.07			mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Lead		U		mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Mercury		U		mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Selenium		U		mg/L	GW
DRB-MW02	DRB-MW02	S		7/1/90	Silver		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,1,1-Trichloroethane	960			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,1-Dichloroethane	91			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,1-Dichloroethene	191			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,2-Dichloropropane	2.5			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	2,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Chloroform	1.5			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	cis-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Methylene chloride	1.2			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Tetrachloroethene	78			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	trans-1,2-Dichloroethene	53			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Trichloroethene	450			ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		7/12/86	Xylene (Total)		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		9/9/86	1,1,1-Trichloroethane	1010			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,1-Dichloroethane	95			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,1-Dichloroethene	115			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Tetrachloroethene	95			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Toluene	50			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	trans-1,2-Dichloroethene	70			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Trichloroethene	610			ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/9/86	Xylene (Total)		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,1,1-Trichloroethane	1350			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,1-Dichloroethane	137			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,1-Dichloroethene	144			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,2-Dichloropropane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		11/24/86	1,3-Dichlorobenzene	90			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Arsenic	2			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Barium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Benzene	20			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	C		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Cadmium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Chlorobenzene	16			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Ethylbenzene	26			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Iron		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Manganese	5800			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Mercury		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Oil & grease		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Phenol	10			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Selenium	6			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Silver		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Tetrachloroethene	140			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Toluene	20			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	trans-1,2-Dichloroethene	94			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Trichloroethene	1080			ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Xylene (Total)		U		ug/L	GW
DRB-MW03	DRB-MW03	S		11/24/86	Zinc		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,1,1-Trichloroethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		3/12/90	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Barium	20			ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Cadmium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	n-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Oil & grease	3200			ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Trichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/12/90	Xylene (Total)		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,1,1-Trichloroethane		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		6/14/90	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Barium	60			ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Cadmium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Oil & grease		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Toluene	0.3			ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Trichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/14/90	Xylene (Total)	1.2			ug/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Antimony		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Arsenic		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Barium	0.04			mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Cadmium		U		mg/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		7/1/90	Chromium		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Iron	0.07			mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Lead		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Mercury		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Selenium		U		mg/L	GW
DRB-MW03	DRB-MW03	S		7/1/90	Silver		U		mg/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Barium	50			ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Cadmium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Chloroform	1.5			ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Methylene chloride	2.4			ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Oil & grease		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Toluene	0.2			ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	trans-1,3-Dichloropropene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		9/5/90	Trichloroethene	0.4			ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/5/90	Xylene (Total)	1.2			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1,1-Trichloroethane	4.8			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1-Dichloroethane	4.4			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,1-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2-Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,3-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	2,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	2-Chlorotoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	4-Chloroaniline		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	4-Isopropyltoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Arsenic	410			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Bromobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Bromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Chloromethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		5/31/94	Chromium	58			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	cis-1,2-Dichloroethene	14			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Hexachlorobutadiene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Isopropylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Lead	110			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	m,p-Xylene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Naphthalene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	n-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	n-Propylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	o-Xylene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	pH	7.4			SU	GW
DRB-MW03	DRB-MW03	S		5/31/94	sec-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Specific Conductance	1.4			umHOS/cm	GW
DRB-MW03	DRB-MW03	S		5/31/94	Styrene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	tert-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Tetrachloroethene	7.8			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Trichloroethene	17			ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		5/31/94	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1,1-Trichloroethane	4.8			ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,1-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2-Dibromo-3-chloropropane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		6/7/95	1,2-Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,3-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	2,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	2-Chlorotoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	4-Chloroaniline		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	4-Isopropyltoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Bromobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Bromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Chromium	18			ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	cis-1,2-Dichloroethene	1.7			ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Hexachlorobutadiene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Isopropylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Lead	15			ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	m,p-Xylene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Naphthalene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	n-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	n-Propylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	o-Xylene		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		6/7/95	pH	7.1			SU	GW
DRB-MW03	DRB-MW03	S		6/7/95	sec-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Specific Conductance	34			umHOS/cm	GW
DRB-MW03	DRB-MW03	S		6/7/95	Styrene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	tert-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Trichloroethene	22			ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/7/95	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Specific Conductance	1360			umHOS/cm	GW
DRB-MW03	DRB-MW03	S		8/22/95	Styrene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Trichloroethene	28			ug/L	GW
DRB-MW03	DRB-MW03	S		8/22/95	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Chromium	157			ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	pH	7.4			SU	GW
DRB-MW03	DRB-MW03	S		12/11/95	Specific Conductance	960			umHOS/cm	GW
DRB-MW03	DRB-MW03	S		12/11/95	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Trichloroethene	33			ug/L	GW
DRB-MW03	DRB-MW03	S		12/11/95	Vinyl chloride		U		ug/L	GW

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Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		12/11/95	Xylene (Total)		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,1-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2-Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,3-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	1,4-Dichlorobenzene	1			ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	2,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	2-Chlorotoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	4-Chloroaniline		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	4-Isopropyltoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Bromobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Bromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	cis-1,2-Dichloroethene	2.4			ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		3/13/96	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Ethylbenzene	0.6			ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Hexachlorobutadiene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Isopropylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	m,p-Xylene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Naphthalene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	n-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	n-Propylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	o-Xylene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	pH	7.5			SU	GW
DRB-MW03	DRB-MW03	S		3/13/96	sec-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Specific Conductance	1050			umHOS/cm	GW
DRB-MW03	DRB-MW03	S		3/13/96	Styrene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	tert-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Toluene	0.7			ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Trichloroethene	29			ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		3/13/96	Xylene (Total)	2.2			ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,1-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2,3-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2-Dibromo-3-chloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2-Dibromomethane		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		6/10/96	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,3-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	2,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	2-Chlorotoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	4-Chloroaniline		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Bromobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Bromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Chromium	18.8			ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	cis-1,2-Dichloroethene	3.6			ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Hexachlorobutadiene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Isopropylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Methylene chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Naphthalene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	n-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	n-Propylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	sec-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Styrene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	tert-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Tetrachloroethene		U		ug/L	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		6/10/96	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Trichloroethene	36			ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		6/10/96	Xylene (Total)		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	2-Chloroethylvinyl ether		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Dichlorodifluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Methylene chloride	3.8			ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Trichloroethene	34			ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		9/24/96	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		9/24/96	Xylene (Total)		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,1,1-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,1,2-Trichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,1-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,1-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2,3-Trichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2,4-Trichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2,4-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2-Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2-Dichloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,2-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,3,5-Trimethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,3-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,3-Dichloropropane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	1,4-Dichlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	2-Chlorotoluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	4-Chloroaniline		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Arsenic		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Benzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Bromobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Bromodichloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Bromoform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Bromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Carbon Tetrachloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Chlorobenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Chloroethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Chloroform		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Chloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Chromium		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	cis-1,2-Dichloroethene	7.1			ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	cis-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Dibromochloromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Dibromomethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Ethylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Hexachlorobutadiene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
DRB-MW03	DRB-MW03	S		1/7/97	Lead		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Methylene chloride	3			ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Naphthalene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	n-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	n-Propylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	sec-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	tert-Butylbenzene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Tetrachloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Toluene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	trans-1,2-Dichloroethene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	trans-1,3-Dichloropropene		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Trichloroethene	55			ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Trichlorofluoromethane		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Vinyl chloride		U		ug/L	GW
DRB-MW03	DRB-MW03	S		1/7/97	Xylene (Total)		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,1,1-Trichloroethane	7.7			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,1-Dichloroethane	4.1			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,1-Dichloroethene	2			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,2-Dichloroethane-d4 (S) %	96			%	GW
GP#54-1	GP#54-1		20	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	4-Bromofluorobenzene (S) %	104			%	GW
GP#54-1	GP#54-1		20	1/21/98	Benzene	28			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Bromoform		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Bromomethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Carbon Tetrachloride		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Chloroethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Chloroform	1.4			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Chloromethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	cis-1,2-Dichloroethene	14			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Dibromofluoromethane (S) %	99			%	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GP#54-1	GP#54-1		20	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	o-Xylene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Tetrachloroethene	98			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Toluene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Toluene-d8 (S) %	98			%	GW
GP#54-1	GP#54-1		20	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Trichloroethene	56			ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-1	GP#54-1		20	1/21/98	Vinyl chloride		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,1,1-Trichloroethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,1-Dichloroethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,1-Dichloroethene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,2-Dichloroethane-d4 (S) %	102			%	GW
GP#54-1	GP#54-1		33	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	4-Bromofluorobenzene (S) %	105			%	GW
GP#54-1	GP#54-1		33	1/21/98	Benzene	19			ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Bromoform		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Bromomethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Carbon Tetrachloride	13			ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Chloroethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Chloroform	13			ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Chloromethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	cis-1,2-Dichloroethene	37			ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Dibromofluoromethane (S) %	104			%	GW
GP#54-1	GP#54-1		33	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Methylene chloride		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GP#54-1	GP#54-1		33	1/21/98	o-Xylene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Tetrachloroethene	3.6			ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Toluene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Toluene-d8 (S) %	97			%	GW
GP#54-1	GP#54-1		33	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Trichloroethene	200			ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-1	GP#54-1		33	1/21/98	Vinyl chloride		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,1,1-Trichloroethane	7.6			ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,1-Dichloroethane	2.6			ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,1-Dichloroethene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,2-Dichloroethane-d4 (S) %	86			%	GW
GP#54-2	GP#54-2		20	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	4-Bromofluorobenzene (S) %	106			%	GW
GP#54-2	GP#54-2		20	1/21/98	Benzene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Bromoform		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Bromomethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Carbon Tetrachloride		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Chloroethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Chloroform		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Chloromethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	cis-1,2-Dichloroethene	22			ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Dibromofluoromethane (S) %	96			%	GW
GP#54-2	GP#54-2		20	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	o-Xylene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Tetrachloroethene	130			ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Toluene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GP#54-2	GP#54-2		20	1/21/98	Toluene-d8 (S) %	91			%	GW
GP#54-2	GP#54-2		20	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Trichloroethene	120			ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-2	GP#54-2		20	1/21/98	Vinyl chloride		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,1,1-Trichloroethane	14			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,1-Dichloroethane	5.3			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,1-Dichloroethene	3.9			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,2-Dichloroethane-d4 (S) %	92			%	GW
GP#54-2	GP#54-2		33	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	4-Bromofluorobenzene (S) %	111			%	GW
GP#54-2	GP#54-2		33	1/21/98	Benzene	110			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Bromoform		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Bromomethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Carbon Tetrachloride		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Chloroethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Chloroform	40			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Chloromethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	cis-1,2-Dichloroethene	51			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Dibromofluoromethane (S) %	101			%	GW
GP#54-2	GP#54-2		33	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	o-Xylene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Tetrachloroethene	29			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Toluene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Toluene-d8 (S) %	98			%	GW
GP#54-2	GP#54-2		33	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GP#54-2	GP#54-2		33	1/21/98	Trichloroethene	100			ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-2	GP#54-2		33	1/21/98	Vinyl chloride	23			ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,1,1-Trichloroethane	5.7			ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,1-Dichloroethane	2.8			ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,1-Dichloroethene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,2-Dichloroethane-d4 (S) %	94			%	GW
GP#54-3	GP#54-3		20	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	4-Bromofluorobenzene (S) %	104			%	GW
GP#54-3	GP#54-3		20	1/21/98	Benzene	2.7			ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Bromoform		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Bromomethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Carbon Tetrachloride		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Chloroethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Chloroform		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Chloromethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	cis-1,2-Dichloroethene	59		E	ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Dibromofluoromethane (S) %	100			%	GW
GP#54-3	GP#54-3		20	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	o-Xylene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Tetrachloroethene	24			ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Toluene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Toluene-d8 (S) %	95			%	GW
GP#54-3	GP#54-3		20	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Trichloroethene	53		E	ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-3	GP#54-3		20	1/21/98	Vinyl chloride		U		ug/L	GW

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GP#54-3	GP#54-3		34	1/21/98	1,1,1-Trichloroethane	22			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,1-Dichloroethane	4.1			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,1-Dichloroethene	4.5			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,2-Dichloroethane-d4 (S) %	90			%	GW
GP#54-3	GP#54-3		34	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	4-Bromofluorobenzene (S) %	111			%	GW
GP#54-3	GP#54-3		34	1/21/98	Benzene	170			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Bromoform		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Bromomethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Carbon Tetrachloride	19			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Chloroethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Chloroform	35			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Chloromethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	cis-1,2-Dichloroethene	38			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Dibromofluoromethane (S) %	96			%	GW
GP#54-3	GP#54-3		34	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	o-Xylene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Tetrachloroethene	40			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Toluene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Toluene-d8 (S) %	100			%	GW
GP#54-3	GP#54-3		34	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Trichloroethene	110			ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-3	GP#54-3		34	1/21/98	Vinyl chloride	11			ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,1,1-Trichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW

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GP#54-4	GP#54-4		20	1/21/98	1,1-Dichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,1-Dichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,2-Dichloroethane-d4 (S) %	92			%	GW
GP#54-4	GP#54-4		20	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	4-Bromofluorobenzene (S) %	106			%	GW
GP#54-4	GP#54-4		20	1/21/98	Benzene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Bromoform		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Bromomethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Carbon Tetrachloride		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Chloroethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Chloroform		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Chloromethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	cis-1,2-Dichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Dibromofluoromethane (S) %	94			%	GW
GP#54-4	GP#54-4		20	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	o-Xylene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Tetrachloroethene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Toluene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Toluene-d8 (S) %	97			%	GW
GP#54-4	GP#54-4		20	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Trichloroethene	1.1			ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-4	GP#54-4		20	1/21/98	Vinyl chloride		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,1,1-Trichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,1,2-Trichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,1-Dichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,1-Dichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,2-Dichlorobenzene		U		ug/L	GW

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GP#54-4	GP#54-4		36	1/21/98	1,2-Dichloroethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,2-Dichloroethane-d4 (S) %	98			%	GW
GP#54-4	GP#54-4		36	1/21/98	1,2-Dichloropropane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,3-Dichlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	1,4-Dichlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	4-Bromofluorobenzene (S) %	105			%	GW
GP#54-4	GP#54-4		36	1/21/98	Benzene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Bromodichloromethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Bromoform		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Bromomethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Carbon Tetrachloride		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Chlorobenzene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Chloroethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Chloroform		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Chloromethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	cis-1,2-Dichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	cis-1,3-Dichloropropene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Dibromochloromethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Dibromofluoromethane (S) %	96			%	GW
GP#54-4	GP#54-4		36	1/21/98	Ethylbenzene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	m,p-Xylene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Methylene chloride		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	o-Xylene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Tetrachloroethene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Toluene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Toluene-d8 (S) %	95			%	GW
GP#54-4	GP#54-4		36	1/21/98	trans-1,2-Dichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	trans-1,3-Dichloropropene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Trichloroethene		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Trichlorofluoromethane		U		ug/L	GW
GP#54-4	GP#54-4		36	1/21/98	Vinyl chloride		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,1-Dichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,2-Dichloroethane-d4 (S) %	88			%	GW
GPA10-1	GPA10-1		22	12/18/97	1,2-Dichloropropane		U		ug/L	GW

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GPA10-1	GPA10-1		22	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	4-Bromofluorobenzene (S) %	111			%	GW
GPA10-1	GPA10-1		22	12/18/97	Benzene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Bromoform		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Bromomethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Chlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Chloroethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Chloroform		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Chloromethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Dibromochloromethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Dibromofluoromethane (S) %	99			%	GW
GPA10-1	GPA10-1		22	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	m,p-Xylene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	o-Xylene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Tetrachloroethene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Toluene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Toluene-d8 (S) %	109			%	GW
GPA10-1	GPA10-1		22	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Trichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-1	GPA10-1		22	12/18/97	Vinyl chloride		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,1-Dichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,2-Dichloroethane-d4 (S) %	96			%	GW
GPA10-1	GPA10-1		35	12/18/97	1,2-Dichloropropane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	4-Bromofluorobenzene (S) %	113			%	GW

Groundwater Data in the Vicinity of the Safety Kleen Facility
Wichita, Kansas

Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-1	GPA10-1		35	12/18/97	Benzene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Bromoform		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Bromomethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Chlorobenzene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Chloroethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Chloroform		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Chloromethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Dibromochloromethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Dibromofluoromethane (S) %	99			%	GW
GPA10-1	GPA10-1		35	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	m,p-Xylene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	o-Xylene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Tetrachloroethene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Toluene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Toluene-d8 (S) %	107			%	GW
GPA10-1	GPA10-1		35	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Trichloroethene		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-1	GPA10-1		35	12/18/97	Vinyl chloride		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,1-Dichloroethane	6.2			ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,2-Dichloroethane-d4 (S) %	103			%	GW
GPA10-2	GPA10-2		22	12/18/97	1,2-Dichloropropane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	4-Bromofluorobenzene (S) %	106			%	GW
GPA10-2	GPA10-2		22	12/18/97	Benzene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Bromoform		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-2	GPA10-2		22	12/18/97	Bromomethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Chlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Chloroethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Chloroform		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Chloromethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Dibromochloromethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Dibromofluoromethane (S) %	101			%	GW
GPA10-2	GPA10-2		22	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	m,p-Xylene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	o-Xylene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Tetrachloroethene	6.8			ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Toluene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Toluene-d8 (S) %	102			%	GW
GPA10-2	GPA10-2		22	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Trichloroethene	2.1			ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-2	GPA10-2		22	12/18/97	Vinyl chloride		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,1-Dichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,2-Dichloroethane-d4 (S) %	100			%	GW
GPA10-2	GPA10-2		36	12/18/97	1,2-Dichloropropane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	4-Bromofluorobenzene (S) %	114			%	GW
GPA10-2	GPA10-2		36	12/18/97	Benzene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Bromoform		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Bromomethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Chlorobenzene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-2	GPA10-2		36	12/18/97	Chloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Chloroform		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Chloromethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Dibromochloromethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Dibromofluoromethane (S) %	100			%	GW
GPA10-2	GPA10-2		36	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	m,p-Xylene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	o-Xylene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Tetrachloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Toluene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Toluene-d8 (S) %	107			%	GW
GPA10-2	GPA10-2		36	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Trichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-2	GPA10-2		36	12/18/97	Vinyl chloride		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,1-Dichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,2-Dichloroethane-d4 (S) %	99			%	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,2-Dichloropropane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	4-Bromofluorobenzene (S) %	115			%	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Benzene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Bromoform		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Bromomethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Chlorobenzene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Chloroethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Chloroform		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Chloromethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-2	GPA10-2		36Q1	12/18/97	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Dibromochloromethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Dibromofluoromethane (S) %	99			%	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	m,p-Xylene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	o-Xylene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Tetrachloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Toluene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Toluene-d8 (S) %	102			%	GW
GPA10-2	GPA10-2		36Q1	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Trichloroethene		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-2	GPA10-2		36Q1	12/18/97	Vinyl chloride		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,1-Dichloroethane	5			ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,2-Dichloroethane-d4 (S) %	97			%	GW
GPA10-3	GPA10-3		23	12/18/97	1,2-Dichloropropane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	4-Bromofluorobenzene (S) %	109			%	GW
GPA10-3	GPA10-3		23	12/18/97	Benzene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Bromoform		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Bromomethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Chlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Chloroethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Chloroform		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Chloromethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	cis-1,2-Dichloroethene	1.2			ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Dibromochloromethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-3	GPA10-3		23	12/18/97	Dibromofluoromethane (S) %	97			%	GW
GPA10-3	GPA10-3		23	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	m,p-Xylene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	o-Xylene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Tetrachloroethene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Toluene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Toluene-d8 (S) %	102			%	GW
GPA10-3	GPA10-3		23	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Trichloroethene	1.4			ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-3	GPA10-3		23	12/18/97	Vinyl chloride	22			ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,1-Dichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,1-Dichloroethene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,2-Dichloroethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,2-Dichloroethane-d4 (S) %	98			%	GW
GPA10-3	GPA10-3		36	12/18/97	1,2-Dichloropropane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	4-Bromofluorobenzene (S) %	110			%	GW
GPA10-3	GPA10-3		36	12/18/97	Benzene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Bromodichloromethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Bromoform		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Bromomethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Carbon Tetrachloride		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Chlorobenzene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Chloroethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Chloroform		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Chloromethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Dibromochloromethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Dibromofluoromethane (S) %	97			%	GW
GPA10-3	GPA10-3		36	12/18/97	Ethylbenzene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	m,p-Xylene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-3	GPA10-3		36	12/18/97	Methylene chloride		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	o-Xylene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Tetrachloroethene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Toluene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Toluene-d8 (S) %	105			%	GW
GPA10-3	GPA10-3		36	12/18/97	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Trichloroethene		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Trichlorofluoromethane		U		ug/L	GW
GPA10-3	GPA10-3		36	12/18/97	Vinyl chloride		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,1-Dichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,2-Dichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,2-Dichloroethane-d4 (S) %	102			%	GW
GPA10-4	GPA10-4		18	6/9/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	4-Bromofluorobenzene (S) %	93			%	GW
GPA10-4	GPA10-4		18	6/9/98	Benzene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Bromodichloromethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Bromoform		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Bromomethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Chlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Chloroethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Chloroform		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Chloromethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Dibromochloromethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Dibromofluoromethane (S) %	104			%	GW
GPA10-4	GPA10-4		18	6/9/98	Ethylbenzene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	m,p-Xylene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Methylene chloride		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	o-Xylene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Tetrachloroethene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-4	GPA10-4		18	6/9/98	Toluene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Toluene-d8 (S) %	94			%	GW
GPA10-4	GPA10-4		18	6/9/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Trichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-4	GPA10-4		18	6/9/98	Vinyl chloride		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,1-Dichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,2-Dichloroethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,2-Dichloroethane-d4 (S) %	115			%	GW
GPA10-4	GPA10-4		36	6/9/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	4-Bromofluorobenzene (S) %	92			%	GW
GPA10-4	GPA10-4		36	6/9/98	Benzene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Bromodichloromethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Bromoform		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Bromomethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Chlorobenzene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Chloroethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Chloroform		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Chloromethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Dibromochloromethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Dibromofluoromethane (S) %	108			%	GW
GPA10-4	GPA10-4		36	6/9/98	Ethylbenzene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	m,p-Xylene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Methylene chloride		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	o-Xylene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Tetrachloroethene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Toluene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Toluene-d8 (S) %	96			%	GW
GPA10-4	GPA10-4		36	6/9/98	trans-1,2-Dichloroethene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-4	GPA10-4		36	6/9/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Trichloroethene		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-4	GPA10-4		36	6/9/98	Vinyl chloride		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,1-Dichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,2-Dichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,2-Dichloroethane-d4 (S) %	108			%	GW
GPA10-5	GPA10-5		18	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	4-Bromofluorobenzene (S) %	108			%	GW
GPA10-5	GPA10-5		18	6/11/98	Benzene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Bromoform		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Bromomethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Chloroethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Chloroform		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Chloromethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Dibromofluoromethane (S) %	97			%	GW
GPA10-5	GPA10-5		18	6/11/98	Ethylbenzene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	m,p-Xylene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Methylene chloride	1.3		UB	ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	o-Xylene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Tetrachloroethene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Toluene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Toluene-d8 (S) %	95			%	GW
GPA10-5	GPA10-5		18	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Trichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		18	6/11/98	Trichlorofluoromethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-5	GPA10-5		18	6/11/98	Vinyl chloride		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,1-Dichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,2-Dichloroethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,2-Dichloroethane-d4 (S) %	119			%	GW
GPA10-5	GPA10-5		34	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	4-Bromofluorobenzene (S) %	114			%	GW
GPA10-5	GPA10-5		34	6/11/98	Benzene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Bromoform		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Bromomethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Chloroethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Chloroform		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Chloromethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Dibromofluoromethane (S) %	106			%	GW
GPA10-5	GPA10-5		34	6/11/98	Ethylbenzene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	m,p-Xylene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Methylene chloride	1.5		UB	ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	o-Xylene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Tetrachloroethene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Toluene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Toluene-d8 (S) %	102			%	GW
GPA10-5	GPA10-5		34	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Trichloroethene		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-5	GPA10-5		34	6/11/98	Vinyl chloride		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-6	GPA10-6		20	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,1-Dichloroethane	1.5			ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,2-Dichloroethane	3.6			ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,2-Dichloroethane-d4 (S) %	121			%	GW
GPA10-6	GPA10-6		20	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	4-Bromofluorobenzene (S) %	104			%	GW
GPA10-6	GPA10-6		20	6/11/98	Benzene	66			ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Bromoform		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Bromomethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Chlorobenzene	1.5			ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Chloroethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Chloroform		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Chloromethane	2.9			ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	cis-1,2-Dichloroethene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Dibromofluoromethane (S) %	100			%	GW
GPA10-6	GPA10-6		20	6/11/98	Ethylbenzene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	m,p-Xylene	1.6			ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Methylene chloride	2.2		UB	ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	o-Xylene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Tetrachloroethene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Toluene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Toluene-d8 (S) %	93			%	GW
GPA10-6	GPA10-6		20	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Trichloroethene		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-6	GPA10-6		20	6/11/98	Vinyl chloride		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,1-Dichloroethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,1-Dichloroethene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-6	GPA10-6		32	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,2-Dichloroethane	1.9			ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,2-Dichloroethane-d4 (S) %	109			%	GW
GPA10-6	GPA10-6		32	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	4-Bromofluorobenzene (S) %	111			%	GW
GPA10-6	GPA10-6		32	6/11/98	Benzene	46		E	ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Bromoform		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Bromomethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Chloroethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Chloroform	3.2			ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Chloromethane	1.3			ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	cis-1,2-Dichloroethene	32			ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Dibromofluoromethane (S) %	102			%	GW
GPA10-6	GPA10-6		32	6/11/98	Ethylbenzene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	m,p-Xylene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Methylene chloride	1.8		UB	ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	o-Xylene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Tetrachloroethene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Toluene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Toluene-d8 (S) %	102			%	GW
GPA10-6	GPA10-6		32	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Trichloroethene	20			ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-6	GPA10-6		32	6/11/98	Vinyl chloride	5.7			ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,1-Dichloroethane	5.7			ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,2-Dichloroethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,2-Dichloroethane-d4 (S) %	100			%	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-7	GPA10-7		21	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	4-Bromofluorobenzene (S) %	105			%	GW
GPA10-7	GPA10-7		21	6/11/98	Benzene	12			ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Bromoform		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Bromomethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Chloroethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Chloroform		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Chloromethane	1.3			ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	cis-1,2-Dichloroethene	9.5			ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Dibromofluoromethane (S) %	95			%	GW
GPA10-7	GPA10-7		21	6/11/98	Ethylbenzene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	m,p-Xylene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Methylene chloride	1.6		UB	ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	o-Xylene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Tetrachloroethene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Toluene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Toluene-d8 (S) %	95			%	GW
GPA10-7	GPA10-7		21	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Trichloroethene		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-7	GPA10-7		21	6/11/98	Vinyl chloride	3.2			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,1,1-Trichloroethane	1.7			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,1-Dichloroethane	1.7			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,1-Dichloroethene	2.7			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,2-Dichloroethane	2.5			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,2-Dichloroethane-d4 (S) %	103			%	GW
GPA10-7	GPA10-7		35	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-7	GPA10-7		35	6/11/98	4-Bromofluorobenzene (S) %	106			%	GW
GPA10-7	GPA10-7		35	6/11/98	Benzene	68			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Bromoform		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Bromomethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Carbon Tetrachloride	13			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Chloroethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Chloroform	35			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Chloromethane	8.1			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	cis-1,2-Dichloroethene	65			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Dibromofluoromethane (S) %	94			%	GW
GPA10-7	GPA10-7		35	6/11/98	Ethylbenzene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	m,p-Xylene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Methylene chloride	5.1		UB	ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	o-Xylene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Tetrachloroethene	5.9			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Toluene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Toluene-d8 (S) %	95			%	GW
GPA10-7	GPA10-7		35	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Trichloroethene	25			ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-7	GPA10-7		35	6/11/98	Vinyl chloride	17			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,1,1-Trichloroethane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,1-Dichloroethane	30			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,1-Dichloroethene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,2-Dichloroethane	16			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,2-Dichloroethane-d4 (S) %	119			%	GW
GPA10-8	GPA10-8		20	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	4-Bromofluorobenzene (S) %	111			%	GW
GPA10-8	GPA10-8		20	6/11/98	Benzene	420			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Bromodichloromethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-8	GPA10-8		20	6/11/98	Bromoform		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Bromomethane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Carbon Tetrachloride		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Chloroethane	2.8			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Chloroform		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Chloromethane	1.5			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	cis-1,2-Dichloroethene	11			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Dibromofluoromethane (S) %	103			%	GW
GPA10-8	GPA10-8		20	6/11/98	Ethylbenzene	1.1			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	m,p-Xylene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Methylene chloride	3.7		UB	ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	o-Xylene	1.4			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Tetrachloroethene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Toluene	4.3			ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Toluene-d8 (S) %	98			%	GW
GPA10-8	GPA10-8		20	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Trichloroethene		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-8	GPA10-8		20	6/11/98	Vinyl chloride	35			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,1,1-Trichloroethane	19			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,1,2,2-Tetrachloroethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,1,2-Trichloroethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,1-Dichloroethane	17			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,1-Dichloroethene	17			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,2-Dichlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,2-Dichloroethane	6.2			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,2-Dichloroethane-d4 (S) %	111			%	GW
GPA10-8	GPA10-8		32	6/11/98	1,2-Dichloropropane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,3-Dichlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	1,4-Dichlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	4-Bromofluorobenzene (S) %	115			%	GW
GPA10-8	GPA10-8		32	6/11/98	Benzene	180			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Bromodichloromethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Bromoform		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Bromomethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Carbon Tetrachloride	30			ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
GPA10-8	GPA10-8		32	6/11/98	Chlorobenzene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Chloroethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Chloroform	150			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Chloromethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	cis-1,2-Dichloroethene	72			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	cis-1,3-Dichloropropene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Dibromochloromethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Dibromofluoromethane (S) %	102			%	GW
GPA10-8	GPA10-8		32	6/11/98	Ethylbenzene	1.7			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	m,p-Xylene	2.6			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Methylene chloride	5		UB	ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	o-Xylene	1.6			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Tetrachloroethene	12			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Toluene	10			ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Toluene-d8 (S) %	100			%	GW
GPA10-8	GPA10-8		32	6/11/98	trans-1,2-Dichloroethene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	trans-1,3-Dichloropropene		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Trichloroethene	210		D,E	ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Trichlorofluoromethane		U		ug/L	GW
GPA10-8	GPA10-8		32	6/11/98	Vinyl chloride	8.3			ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,1,1-Trichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,1,2,2-Tetrachloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,1,2-Trichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,1-Dichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,1-Dichloroethene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,2-Dichlorobenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,2-Dichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,2-Dichloroethene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,2-Dichloropropane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	1,3-Dichlorobenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Benzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Bromodichloromethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Bromoform		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Bromomethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Carbon Tetrachloride		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Chlorobenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Chloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Chloroform		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Chloromethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	cis-1,3-Dichloropropene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
HRI-MW02D	HRI-02D	D		1/1/87	Dibromochloromethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Ethylbenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Methylene chloride		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	m-Xylene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	o,p-Xylene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Tetrachloroethene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Toluene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	trans-1,3-Dichloropropene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Trichloroethene	8.1			ug/L	GW
HRI-MW02D	HRI-02D	D		1/1/87	Vinyl chloride		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,1,1-Trichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,1,2,2-Tetrachloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,1,2-Trichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,1-Dichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,1-Dichloroethene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,2-Dichlorobenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,2-Dichloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,2-Dichloroethene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,2-Dichloropropane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	1,3-Dichlorobenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Benzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Bromodichloromethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Bromoform		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Bromomethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Carbon Tetrachloride	550			ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Chlorobenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Chloroethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Chloroform		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Chloromethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	cis-1,3-Dichloropropene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Dibromochloromethane		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Ethylbenzene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Methylene chloride		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	m-Xylene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	o,p-Xylene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Tetrachloroethene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Toluene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	trans-1,3-Dichloropropene		U		ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Trichloroethene	1000			ug/L	GW
HRI-MW02D	HRI-02D	D		4/5/89	Vinyl chloride		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
HRI-MW03D	HRI-03D	D		1/1/87	1,1,1-Trichloroethane	122			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,1,2,2-Tetrachloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,1,2-Trichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,1-Dichloroethane	4.4			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,1-Dichloroethene	26.5			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,2-Dichlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,2-Dichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,2-Dichloroethene	76.4			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,2-Dichloropropane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	1,3-Dichlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Benzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Bromodichloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Bromoform		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Bromomethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Carbon Tetrachloride	635			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Chlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Chloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Chloroform	147			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Chloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	cis-1,3-Dichloropropene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Dibromochloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Ethylbenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Methylene chloride	2.6			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	m-Xylene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	o,p-Xylene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Tetrachloroethene	504			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Toluene	0.9			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	trans-1,3-Dichloropropene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Trichloroethene	6260			ug/L	GW
HRI-MW03D	HRI-03D	D		1/1/87	Vinyl chloride		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,1,1-Trichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,1,2,2-Tetrachloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,1,2-Trichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,1-Dichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,1-Dichloroethene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,2-Dichlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,2-Dichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,2-Dichloroethene	0.4			ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,2-Dichloropropane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	1,3-Dichlorobenzene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
HRI-MW03D	HRI-03D	D		4/5/89	Benzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Bromodichloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Bromoform		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Bromomethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Carbon Tetrachloride	14			ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Chlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Chloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Chloroform	7.7			ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Chloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	cis-1,3-Dichloropropene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Dibromochloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Ethylbenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Methylene chloride		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	m-Xylene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	o,p-Xylene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Tetrachloroethene	1.1			ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Toluene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	trans-1,3-Dichloropropene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Trichloroethene	3.5			ug/L	GW
HRI-MW03D	HRI-03D	D		4/5/89	Vinyl chloride		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,1,1-Trichloroethane	24			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,1,2-Trichloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,1-Dichloroethane	3.5			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,1-Dichloroethene	5.8			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,2-Dichlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,2-Dichloroethane	13			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,2-Dichloroethane-d4 (S) %	95			%	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,2-Dichloropropane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,3-Dichlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	1,4-Dichlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	4-Bromofluorobenzene (S) %	101			%	GW
HRI-MW03D	HRI-03D	D		12/9/97	Benzene	410			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Bromodichloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Bromoform		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Bromomethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Carbon Tetrachloride	13			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Chlorobenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Chloroethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Chloroform	26		JTB	ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
HRI-MW03D	HRI-03D	D		12/9/97	Chloromethane	3.4			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	cis-1,2-Dichloroethene	47			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	cis-1,3-Dichloropropene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Dibromochloromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Dibromofluoromethane (S) %	117			%	GW
HRI-MW03D	HRI-03D	D		12/9/97	Ethylbenzene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	m,p-Xylene	1.3			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Methylene chloride		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	o-Xylene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Tetrachloroethene	68		JS	ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Toluene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Toluene-d8 (S) %	115		S	%	GW
HRI-MW03D	HRI-03D	D		12/9/97	trans-1,2-Dichloroethene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	trans-1,3-Dichloropropene		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Trichloroethene	230			ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Trichlorofluoromethane		U		ug/L	GW
HRI-MW03D	HRI-03D	D		12/9/97	Vinyl chloride	11			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,1,1-Trichloroethane	840			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,1,2,2-Tetrachloroethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,1,2-Trichloroethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,1-Dichloroethane	140			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,1-Dichloroethene	350			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,2-Dibromomethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,2-Dichlorobenzene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,2-Dichloroethane	7.6			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,2-Dichloropropane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,3-Dichlorobenzene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	1,4-Dichlorobenzene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	2-Chloroethylvinyl ether		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Benzene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Bromochloromethane (S) %	115			%	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Bromodichloromethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Bromoflourobenezene (Hall)	95.7			%	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Bromofluorobenzene (PID)	114			%	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Bromoform		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Bromomethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Carbon disulfide		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Carbon Tetrachloride		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Chlorobenzene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Chloroethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Chloroform	5.6			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Chloromethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	cis-1,2-Dichloroethene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	cis-1,3-Dichloropropene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Dibromochloromethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Ethylbenzene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Methylene chloride		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Tetrachloroethene	14			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Toluene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	trans-1,2-Dichloroethene	2.1			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	trans-1,3-Dichloropropene		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Trichloroethene	3			ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Trichlorofluoromethane		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Vinyl chloride		U		ug/L	GW
HRI-UPR-MW1S	HRI-UPR1	S		7/25/91	Xylene (Total)		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	1,1,1-Trichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	1,1-Dichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	1,1-Dichloroethene		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	1,2-Dichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Benzene		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Bromodichloromethane		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	BTEX		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Carbon Tetrachloride	150			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Chloroethane		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Chloroform	1.1			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Ethylbenzene		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Methylene chloride		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Tetrachloroethene	1.3			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Tetrachloroethene	1.3			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Tetrachloroethene	220			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Toluene		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	trans-1,2-Dichloroethene	13			ug/L	GW
WND-30D	WND-30D	D		4/1/91	trans-1,2-Dichloroethene	13			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Trichloroethene	220			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Trichlorofluoromethane		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	TVOCs	395			ug/L	GW
WND-30D	WND-30D	D		4/1/91	Vinyl chloride		U		ug/L	GW
WND-30D	WND-30D	D		4/1/91	Xylene (Total)		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,1,1-Trichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,1,2,2-Tetrachloroethane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-30D	WND-30D	D		5/17/91	1,1,2-Trichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,1-Dichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,1-Dichloroethene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,2-Dibromomethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,2-Dichlorobenzene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,2-Dichloroethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,2-Dichloropropane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,3-Dichlorobenzene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	1,4-Dichlorobenzene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	2-Chloroethylvinyl ether		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Benzene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Bromodichloromethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Bromoform		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Bromomethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Carbon disulfide		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Carbon Tetrachloride	150			ug/L	GW
WND-30D	WND-30D	D		5/17/91	Chlorobenzene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Chloroethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Chloroform	11			ug/L	GW
WND-30D	WND-30D	D		5/17/91	Chloromethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	cis-1,2-Dichloroethene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	cis-1,3-Dichloropropene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Dibromochloromethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Ethylbenzene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Methylene chloride		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Tetrachloroethene	1.3			ug/L	GW
WND-30D	WND-30D	D		5/17/91	Toluene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	trans-1,2-Dichloroethene	13			ug/L	GW
WND-30D	WND-30D	D		5/17/91	trans-1,3-Dichloropropene		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Trichloroethene	220			ug/L	GW
WND-30D	WND-30D	D		5/17/91	Trichlorofluoromethane		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Vinyl chloride		U		ug/L	GW
WND-30D	WND-30D	D		5/17/91	Xylene (Total)		U		ug/L	GW
WND-30D	WND-30D	D		5/20/91	Bromochloromethane (S) %	132			%	GW
WND-30D	WND-30D	D		5/20/91	Bromofluorobenzene (Hall)	90.7			%	GW
WND-30D	WND-30D	D		5/20/91	Bromofluorobenzene (PID)	83.3			%	GW
WND-31S	WND-31S	S		7/1/91	1,1,1-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	1,1-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	1,1-Dichloroethene		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	1,2-Dichloroethane		U		ug/L	GW

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WND-31S	WND-31S	S		7/1/91	Benzene		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Bromodichloromethane		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	BTEX		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Carbon Tetrachloride		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Chloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Chloroform	12			ug/L	GW
WND-31S	WND-31S	S		7/1/91	Ethylbenzene		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Methylene chloride		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Tetrachloroethene	6.9			ug/L	GW
WND-31S	WND-31S	S		7/1/91	Tetrachloroethene		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Toluene		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	trans-1,2-Dichloroethene	0.5			ug/L	GW
WND-31S	WND-31S	S		7/1/91	trans-1,2-Dichloroethene	0.15			ug/L	GW
WND-31S	WND-31S	S		7/1/91	Trichloroethene	6.9			ug/L	GW
WND-31S	WND-31S	S		7/1/91	Trichlorofluoromethane		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	TVOCs	19.4			ug/L	GW
WND-31S	WND-31S	S		7/1/91	Vinyl chloride		U		ug/L	GW
WND-31S	WND-31S	S		7/1/91	Xylene (Total)		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,1,1-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,1,2,2-Tetrachloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,1,2-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,1-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,1-Dichloroethene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,2-Dibromomethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,2-Dichlorobenzene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,2-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,2-Dichloropropane	0.4			ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,3-Dichlorobenzene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	1,4-Dichlorobenzene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	2-Chloroethylvinyl ether		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Benzene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Bromochloromethane (S) %	86.7			%	GW
WND-31S	WND-31S	S		7/25/91	Bromodichloromethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Bromofluorobenzene (Hall)	95.7			%	GW
WND-31S	WND-31S	S		7/25/91	Bromofluorobenzene (PID)	111			%	GW
WND-31S	WND-31S	S		7/25/91	Bromoform		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Bromomethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Carbon disulfide		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Carbon Tetrachloride		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Chlorobenzene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-31S	WND-31S	S		7/25/91	Chloroethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Chloroform	12			ug/L	GW
WND-31S	WND-31S	S		7/25/91	Chloromethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	cis-1,2-Dichloroethene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	cis-1,3-Dichloropropene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Dibromochloromethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Ethylbenzene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Methylene chloride		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Tetrachloroethene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Toluene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	trans-1,2-Dichloroethene	0.5			ug/L	GW
WND-31S	WND-31S	S		7/25/91	trans-1,3-Dichloropropene		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Trichloroethene	6.9			ug/L	GW
WND-31S	WND-31S	S		7/25/91	Trichlorofluoromethane		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Vinyl chloride		U		ug/L	GW
WND-31S	WND-31S	S		7/25/91	Xylene (Total)		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,1,1-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,1,2-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,1-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,1-Dichloroethene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,2-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,2-Dichloroethene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	1,2-Dichloropropane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	2-Hexanone		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	4-Methyl-2-pentanone		U	J	ug/L	GW
WND-31S	WND-31S	S		8/1/96	Acetone		U	J	ug/L	GW
WND-31S	WND-31S	S		8/1/96	Acrolein		U	J	ug/L	GW
WND-31S	WND-31S	S		8/1/96	Acrylonitrile		U	J	ug/L	GW
WND-31S	WND-31S	S		8/1/96	Benzene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Bromodichloromethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Bromoform		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Bromomethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Carbon disulfide		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Carbon Tetrachloride		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Chlorobenzene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Chloroethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Chloroform	6			ug/L	GW
WND-31S	WND-31S	S		8/1/96	Chloromethane		U	J	ug/L	GW
WND-31S	WND-31S	S		8/1/96	cis-1,3-Dichloropropene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-31S	WND-31S	S		8/1/96	Dibromochloromethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Dichlorodifluoromethane		U	R	ug/L	GW
WND-31S	WND-31S	S		8/1/96	Ethylbenzene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Methyl ethyl ketone		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Methylene chloride		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Styrene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Tetrachloroethene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Tetrahydrofuran		U	J	ug/L	GW
WND-31S	WND-31S	S		8/1/96	Toluene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	trans-1,3-Dichloropropene		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Trichloroethene	5			ug/L	GW
WND-31S	WND-31S	S		8/1/96	Trichlorofluoromethane		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	TVOCs	11			ug/L	GW
WND-31S	WND-31S	S		8/1/96	Vinyl acetate		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Vinyl chloride		U		ug/L	GW
WND-31S	WND-31S	S		8/1/96	Xylene (Total)		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1,1,2-Tetrachloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1,1-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1,2-Trichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1-Dichloroethene	2.4			ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,1-Dichloropropene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2,3-Trichlorobenzene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2,3-Trichloropropane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2,4-Trichlorobenzene	1.6			ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2,4-Trimethylbenzene	1.9			ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2-Dibromo-3-chloropropane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2-Dichlorobenzene	2.1			ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2-Dichloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,2-Dichloropropane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,3,5-Trimethylbenzene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,3-Dichlorobenzene	2.2			ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,3-Dichloropropane	1.3			ug/L	GW
WND-31S	WND-31S	S		10/29/97	1,4-Dichlorobenzene	2.3			ug/L	GW
WND-31S	WND-31S	S		10/29/97	2,2-Dichloropropane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	2-Butanone		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	2-Chlorotoluene	2.3			ug/L	GW
WND-31S	WND-31S	S		10/29/97	4-Chlorotoluene	1.4			ug/L	GW
WND-31S	WND-31S	S		10/29/97	4-Methyl-2-pentanone		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-31S	WND-31S	S		10/29/97	Acetone		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Benzene	2.3			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Bromobenzene	1.9			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Bromochloromethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Bromodichloromethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Bromoform		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Bromomethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Carbon Tetrachloride	1.3			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Chlorobenzene	2.1			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Chloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Chloroform	5.3			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Chloromethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	cis-1,2-Dichloroethene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	cis-1,3-Dichloropropene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Dibromochloromethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Dibromomethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Dichlorodifluoromethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Ethylbenzene	1.8			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Freon 113		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Hexachlorobutadiene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Hexachloroethane		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Isopropylbenzene	2			ug/L	GW
WND-31S	WND-31S	S		10/29/97	m,p-Xylene	3.7			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Methyl methacrylate		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Methylene chloride		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Naphthalene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	n-Butylbenzene	1.9			ug/L	GW
WND-31S	WND-31S	S		10/29/97	n-Propylbenzene	1.8			ug/L	GW
WND-31S	WND-31S	S		10/29/97	o-Xylene	1.8			ug/L	GW
WND-31S	WND-31S	S		10/29/97	p-Isopropyltoluene	2			ug/L	GW
WND-31S	WND-31S	S		10/29/97	sec-Butylbenzene	1.7			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Styrene	1.4			ug/L	GW
WND-31S	WND-31S	S		10/29/97	tert-Butylbenzene	2			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Tetrachloroethene	2			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Toluene	2			ug/L	GW
WND-31S	WND-31S	S		10/29/97	trans-1,2-Dichloroethene	2.4			ug/L	GW
WND-31S	WND-31S	S		10/29/97	trans-1,3-Dichloropropene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	trans-1,4-dichloro-2-butene		U		ug/L	GW
WND-31S	WND-31S	S		10/29/97	Trichloroethene	9.6			ug/L	GW
WND-31S	WND-31S	S		10/29/97	Trichlorofluoromethane	1.5			ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-31S	WND-31S	S		10/29/97	Vinyl chloride		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	1,1,1-Trichloroethane	0.3			ug/L	GW
WND-32S	WND-32S	S		7/1/91	1,1-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	1,1-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	1,2-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Benzene		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Bromodichloromethane		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	BTEX		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Carbon Tetrachloride	5.9			ug/L	GW
WND-32S	WND-32S	S		7/1/91	Chloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Chloroform	13			ug/L	GW
WND-32S	WND-32S	S		7/1/91	Ethylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Methylene chloride		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Tetrachloroethene	5.1			ug/L	GW
WND-32S	WND-32S	S		7/1/91	Tetrachloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Toluene		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	trans-1,2-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Trichloroethene	5.1			ug/L	GW
WND-32S	WND-32S	S		7/1/91	Trichlorofluoromethane		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	TVOCs	24.3			ug/L	GW
WND-32S	WND-32S	S		7/1/91	Vinyl chloride		U		ug/L	GW
WND-32S	WND-32S	S		7/1/91	Xylene (Total)		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,1,1-Trichloroethane	0.3			ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,1,2,2-Tetrachloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,1,2-Trichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,1-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,1-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,2-Dibromomethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,2-Dichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,2-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,2-Dichloropropane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,3-Dichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	1,4-Dichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	2-Chloroethylvinyl ether		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Benzene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Bromochloromethane (S) %	86.7			%	GW
WND-32S	WND-32S	S		7/25/91	Bromodichloromethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Bromofluorobenzene (Hall)	95.7			%	GW
WND-32S	WND-32S	S		7/25/91	Bromofluorobenzene (PID)	111			%	GW
WND-32S	WND-32S	S		7/25/91	Bromoform		U		ug/L	GW

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WND-32S	WND-32S	S		7/25/91	Bromomethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Carbon disulfide		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Carbon Tetrachloride	5.9			ug/L	GW
WND-32S	WND-32S	S		7/25/91	Chlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Chloroethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Chloroform	13			ug/L	GW
WND-32S	WND-32S	S		7/25/91	Chloromethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	cis-1,2-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	cis-1,3-Dichloropropene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Dibromochloromethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Ethylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Methylene chloride		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Tetrachloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Toluene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	trans-1,2-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	trans-1,3-Dichloropropene		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Trichloroethene	5.1			ug/L	GW
WND-32S	WND-32S	S		7/25/91	Trichlorofluoromethane		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Vinyl chloride		U		ug/L	GW
WND-32S	WND-32S	S		7/25/91	Xylene (Total)		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,1,1-Trichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,1,2,2-Tetrachloroethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,1,2-Trichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,1-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,1-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,2-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,2-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	1,2-Dichloropropane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	2-Hexanone		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	4-Methyl-2-pentanone		U	J	ug/L	GW
WND-32S	WND-32S	S		8/1/96	Acetone		U	J	ug/L	GW
WND-32S	WND-32S	S		8/1/96	Acrolein		U	J	ug/L	GW
WND-32S	WND-32S	S		8/1/96	Acrylonitrile		U	J	ug/L	GW
WND-32S	WND-32S	S		8/1/96	Benzene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Bromodichloromethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Bromoform		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Bromomethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Carbon disulfide		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Carbon Tetrachloride	140			ug/L	GW
WND-32S	WND-32S	S		8/1/96	Chlorobenzene		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-32S	WND-32S	S		8/1/96	Chloroethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Chloroform	120			ug/L	GW
WND-32S	WND-32S	S		8/1/96	Chloromethane		U	J	ug/L	GW
WND-32S	WND-32S	S		8/1/96	cis-1,3-Dichloropropene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Dibromochloromethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Dichlorodifluoromethane		U	R	ug/L	GW
WND-32S	WND-32S	S		8/1/96	Ethylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Methyl ethyl ketone		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Methylene chloride		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Styrene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Tetrachloroethene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Tetrahydrofuran		U	J	ug/L	GW
WND-32S	WND-32S	S		8/1/96	Toluene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	trans-1,3-Dichloropropene		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Trichloroethene	21			ug/L	GW
WND-32S	WND-32S	S		8/1/96	Trichlorofluoromethane		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	TVOCs	281			ug/L	GW
WND-32S	WND-32S	S		8/1/96	Vinyl acetate		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Vinyl chloride		U		ug/L	GW
WND-32S	WND-32S	S		8/1/96	Xylene (Total)		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1,1,2-Tetrachloroethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1,1-Trichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1,2,2-Tetrachloroethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1,2-Trichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,1-Dichloropropene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2,3-Trichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2,3-Trichloropropane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2,4-Trichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2,4-Trimethylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2-Dibromo-3-chloropropane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2-Dichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2-Dichloroethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,2-Dichloropropane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,3,5-Trimethylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,3-Dichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,3-Dichloropropane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	1,4-Dichlorobenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	2,2-Dichloropropane		U		ug/L	GW

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Station ID	Map ID	Well Comp. Depth	Sample Depth	Sample Date	Parameter	Result	Lab. Qualifier	Other Qualifier	Units	Media Type
WND-32S	WND-32S	S		10/29/97	Isopropylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	m,p-Xylene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Methyl methacrylate		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Methylene chloride	11			ug/L	GW
WND-32S	WND-32S	S		10/29/97	Naphthalene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	n-Butylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	n-Propylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	o-Xylene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	p-Isopropyltoluene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	sec-Butylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Styrene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	tert-Butylbenzene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Tetrachloroethene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Toluene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	trans-1,2-Dichloroethene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	trans-1,3-Dichloropropene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	trans-1,4-dichloro-2-butene		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Trichloroethene	1.4			ug/L	GW
WND-32S	WND-32S	S		10/29/97	Trichlorofluoromethane		U		ug/L	GW
WND-32S	WND-32S	S		10/29/97	Vinyl chloride		U		ug/L	GW

APPENDIX F

Professional Profiles

CAROL EDSON
Senior Engineer

EDUCATION AND PROFESSIONAL QUALIFICATIONS:

Remedial Investigations
Feasibility Studies
CERCLA/RCRA regulations

B.S. in Chemical and Petroleum Refining Engineering (minor in Organic Chemistry), Colorado School of Mines, Golden, Colorado, 1985

EPA Course in Sampling for Hazardous Materials

EPA Emergency Response Training

Safety-Kleen 40-Hour OSHA Hazardous Materials Health and Safety Training Course and Annual 8-Hour HAZWOPER Refresher Course

In-Situ Soil Remediation, University of Milwaukee Center for Continuing Engineering Education

OSHA Supervisor's Training Course

EPA Incident Mitigation

EPA Risk and Decision Making

EPA Mixed Waste Training Course

OSHA Excavation Training

SPECIAL QUALIFICATIONS:

- 13 years of project management and engineering experience, with 10 years of experience in all phases of CERCLA and RCRA hazardous waste projects, including RI/FS, design, risk assessment, removal actions, treatability studies, quality assurance/quality control, and community relations.
- Extensive experience on remedial projects involving regulatory negotiations and analysis, both as a state regulator and in support of Safety-Kleen clients.

RECORD OF EXPERIENCE:

Senior Engineer, Environmental Decision Group, Inc., a Safety-Kleen Company.

Specific Duties, Responsibilities, and Assignments: Ms. Edson manages and provides senior oversight of soil and groundwater assessment and remediation projects. Her responsibilities include client and regulatory agency interface, project management, budget development, cost control, and scheduling. She has developed action levels at several project sites using EPA and state risk assessment methodologies.

CERCLA Drum Sampling and Removal Action, Lorentz Barrel PRP Group, San Jose, California. Managed a drum sampling and removal action for a PRP coalition at the Lorentz Barrel and Drum CERCLA site in California. Acted as the principal client contact to EPA.

Remedial Investigation and Feasibility Study, Transportation Client, Oregon. Conducting a multi-phase remedial investigation and feasibility study for remediation of hydrocarbon-contaminated groundwater at an Oregon Superfund site.

Hydrocarbon Sludge Sampling, Transportation Client, Iowa. Project manager for site sampling and remedial alternatives analysis of a hydrocarbon sludge pond contaminated with carcinogenic volatile organics. Coordinated bench-scale treatability tests on the sludge.

Site Assessment, Former Railyard, California. Managed a site assessment of a former railyard with potential contamination by metals and volatile organics in soils and groundwater. The assessment included soil gas sampling and soils sampling and analysis.

Mixed Radioactive/Hazardous Soil Disposal, Transportation Client, Arkansas. Identified alternatives for and coordinated the treatment and disposal of mixed radioactive/hazardous soils.

Pond Closure, Transportation Client, California. Managed the closure of five wastewater ponds contaminated with 20,000 cubic yards of oily sludge. The pond water was treated and discharged and the sludge was stabilized on-site and transported by rail for off-site disposal.

Superfund Project Manager, Colorado Department of Health. *Specific Duties, Responsibilities, and Assignments:* Lowry Landfill, Aurora, Colorado. Reviewed RI/FS documents for technical aspects and compliance with state laws, including solid/hazardous waste, groundwater, and air regulations. Negotiated consent orders and scopes of work for site operable units. Served on the Governor's Lowry Landfill Monitoring Committee.

Marshall Landfill, Boulder County, Colorado. Negotiated RD/RA order for implementation of groundwater and soil gas remedy and reviewed remedial design documents.

Denver Radium Site, Denver, Colorado. Managed contractor performance and budget for the first state-lead RI/FS in Colorado. Performed treatability studies on radioactive wastes.

Process Engineer, Exxon Company USA. *Specific Duties, Responsibilities, and Assignments:* While employed with Exxon, optimized operations of two crude-oil distillation towers, through daily monitoring and engineering design modifications. Planned and implemented a large-scale plant test requiring extensive coordination with several operating departments. Revised the monthly energy monitoring report through detailed analysis, calculations, and computer spreadsheet reformatting, thereby considerably reducing annual unaccountable energy costs.

EMPLOYMENT SUMMARY:

Environmental Decision Group, Inc., a Safety-Kleen Company, Boulder, Colorado. Senior Engineer, 1990-Present.

Colorado Department of Health, Denver, Colorado. Engineer C, 1987-90.

Exxon Company, USA, Benicia, California. Process Engineer, 1985-86.

PROFESSIONAL ASSOCIATIONS:

Member, American Institute of Chemical Engineers

Member, Colorado School of Mines Alumni Association

SUSAN M. FLACK
Senior Toxicologist-Consultant

EDUCATION AND PROFESSIONAL QUALIFICATIONS:

M.S. in Clinical Chemistry and Toxicology, Cleveland State University, Cleveland, Ohio, 1984

B.A. in Chemistry, Case Western Reserve, University, Cleveland, Ohio, 1981

National Registry in Clinical Chemistry, 1984

US Department of Energy Q-Level Security Clearance, 1991 (active)

OSHA 40-hour Hazardous Materials Health and Safety Training Course

Harvard School of Public Health, Benefit-Cost Analysis for Environmental, Health, and Safety Regulation, 1997

Pathway Analysis and Risk Assessment for Environmental Compliance and Dose Reconstruction, 1994

Risk assessments
Toxicology
Environmental chemistry
Soil/Groundwater investigations
and remediation

SPECIAL QUALIFICATIONS:

- Direct experience conducting health risk assessments since 1987.
- 20 years of related experience in industrial and medical research.
- Experienced in regulatory negotiations and public communications.
- Risk assessment of heavy metals, VOCs, radionuclides in air, water, soil and sediment.

RECORD OF EXPERIENCE:

Environmental Toxicologist, Environmental Decision Group, Inc., a Safety-Kleen Company.

Specific Duties, Responsibilities, and Assignments. Ms. Flack has nine years of direct experience in conducting human health risk assessments and 20 years of related experience in basic sciences research and industry. She contributes her knowledge of biochemistry, chemistry, and clinical toxicology to risk assessment strategies. Her work involves the application of risk assessment technologies to create unique solutions to problems related to estimation of human health effects, selection of economic and health protective remediation strategies, and determination of health-based cleanup levels. Ms. Flack specializes in the assessment of human health risk from exposure to radionuclides and heavy metals, and in historical dose reconstruction. She has worked primarily with the aerospace, defense, mining, and chemical industries, and directly with regulatory agencies and concerned citizens in surrounding communities.

Health-Based Clean-Up Levels

Technical risk assessment support for baseline human health risk assessments for Operable Units 2 and 6 at the Rocky Flats Plant. The project includes both on and off-site evaluations of residential and occupational exposure to contaminated soils and groundwater at an 1100-acre site that includes the 903 Pad, Mound and East Trenches. Chemicals of concern include volatile organics, plutonium, and americium.

Task manager of a risk evaluation of remedial alternatives for two unlined cells and a sanitary landfill which contaminated groundwater with volatile organic chemicals at a hazardous waste landfill in Ohio. The risk evaluations considered potential short-term and long-term human and ecological risks associated with four remedial alternatives, including various combinations of source excavation, slurry wall construction and groundwater treatment. Exposure to contaminants volatilized during domestic use of groundwater and surface water by future residents was evaluated for the no groundwater treatment alternative.

Dose Reconstruction

Task manager for the \$1.5 million task to reconstruct the historical doses of mercury received by the public due to mercury releases from the Department of Energy's Y-12 plant in Oak Ridge, Tennessee, which is part of the \$8.5 million Dose Reconstruction Study at the Oak Ridge Reservation for the Tennessee Department of Health.

Task manager for the \$100,000 demographic reconstruction task of the \$4 million Rocky Flats Dose Reconstruction project for the Colorado Department of Health. The 2-year project is a retrospective risk assessment addressing the off-site health impacts of radionuclide and chemical emissions from the Rocky Flats Nuclear Weapons Facility since operations began in 1953. The demographic reconstruction task involves management of a subcontractor and is under the supervision of an advisory panel created by the State of Colorado.

Prepared work plans for the reconstruction of historical operations and demographics at the Department of Energy's Oak Ridge facility, and for the design of a repository for all historical information relevant to the \$2 million Phase I Health Studies at Oak Ridge Reservation conducted by the Tennessee Department of Health.

Assistant project manager for the \$500,000 chemical dose reconstruction task of the \$2 million Phase I of the Environmental Dose Reconstruction at the Idaho National Engineering Laboratory (INEL). This Phase I task includes the identification of documentation of chemical use and process operations relevant to chemical releases at the INEL from 1949 to present.

Permit Application

Project manager for \$500,000 human health risk assessment portion of a permit to construct a hazardous waste incinerator in California. The project included calculation of emission rates using feed rates, destruction removal efficiencies, air pollution control efficiencies, and particle enrichment. Concentrations of heavy metals, dioxins, PCBs, and volatile organic solvents likely to be present in wastes received at the plant (including products of incomplete combustion) in air, soil, surface water, fish, and plants due to deposition and uptake were estimated. Doses of these chemicals likely to be received by the public were estimated through exposure routes including inhalation, dermal contact, and ingestion of soil, plants, water, mother's milk, and meat and dairy products. The risk assessment was reviewed by the public and approved by the Bay Area Air Quality Management District (BAAQMD), California EPA, USEPA Region IX, and Environmental Toxicology International for the City of Martinez, CA. Numerous public meetings were conducted during the review process.

Reviewed risk assessments and provided guidance to the State of Montana for permit applications to build and operate a hazardous waste incinerator. Prepared position papers on multipathway risk assessment of air emissions and the USEPA draft guidance on risk assessment methodology for hazardous waste combustion facilities.

Project manager for a risk assessment submitted to the Bay Area Air Quality Management District (BAAQMD) to obtain a permit to construct and operate a proposed air stripping tower groundwater treatment system in San Jose, California. Air concentrations predicted by the ISCST air dispersion model were used to characterize carcinogenic risks, and acute and chronic noncarcinogenic hazards to humans posed by the groundwater contaminants (i.e., chlorinated organics). As a result of the health risk assessment, the permit to construct and operate the system was granted by the BAAQMD.

Litigation Support

Author of a position paper on environmental sources of blood lead and trends in children's blood lead levels to support litigation related to proposed remedial actions at a Superfund site in Colorado was contaminated by mine waste and tailings from past mining operations. Managed a statistical analysis of paired child blood lead and environmental lead data to identify relationships that could be included in predictive models, such as the USEPA's IUBK Lead Model.

Prepared a position paper on skin sensitization to chromium in both animals and humans for the purpose of establishing cleanup levels for chromium-contaminated soil at a major East Coast site.

Risk Communication

Senior technical reviewer for a \$750,000 public involvement program for the Tennessee Department of Health's Oak Ridge Health Studies.

Site Investigation

Task manager of the \$50,000 air assessment task of a \$1 million multipathway risk assessment and facility audit for a large aerospace industrial site in southern California. The scope of work included risk assessment, agency negotiations, and public participation. The primary chemicals of concern are chlorinated solvents, PAHs, metals, and radionuclides.

Reviewed risk assessments for residential/commercial development of a Fortune 500 defense contractor's 100-acre manufacturing facility in San Jose, California. Accurate interpretation of various consultants' information and additional focused investigation of historical practices eliminated all but 10 acres from 67.5 acres that were previously identified as requiring from \$3.1 to \$10.1 million of soil remediation.

EMPLOYMENT SUMMARY:

Environmental Decision Group, Inc., a *Safety-Kleen Company*, Consulting Senior Toxicologist, 1997-Present.
McLaren/Hart Environmental Services, Inc., Senior Associate Health Scientist, 1994-1997.
Woodward-Clyde Consultants. Project Scientist, 1991-1994.
ChemRisk, A Division of McLaren/Hart, Inc. Senior Associate Health Scientist, 1989-1991.
Masters Builders Technologies. Product Development Specialist, 1985-1989.
Cleveland Clinic Foundation, Department of Cardiovascular Neurobiology. Research Scientist, 1980-1985.

PUBLICATIONS AND PRESENTATIONS:

"Key Accomplishments of the Rocky Flats Toxicologic Review and Dose Reconstruction: Selection of Materials of Concern and Source Term Reconstruction." Presented at the Society for Risk Analysis annual meeting in a session titled "Contributions of Dose Reconstruction to the Science of Risk Assessment," December 9, 1996.

"Cost-Effective Environmental Remediation: Data Quality Objectives and Risk Assessment." Presented as a client workshop. November 16, 1993.

"Updates to the Clean Air Act Amendments of 1990 and an Evaluation of the Potential Impacts to the Rocky Flats Plant - Title III and Risk Assessment." Presented as a training course for EG&G Rocky Flats. March 31, 1993.

"Derivation of Health-Based Cleanup Levels in Risk Assessment - A Risk-Based Decision Making Process." Presented as a training course at Hazmacon '90. April 18, 1990. Anaheim, California.

"Health Risk Assessment Requirements of the California Air Toxics 'Hot Spots' Act (AB-2588)." Presented as part of the California Clean Air Course. June 8, 1990. San Francisco, California.

Determan, C.A. and S.M. Flack. 1994. Trends in blood lead levels. Submitted for publication in Hazardous Waste Strategies Update.

Factor, D.F., S.M. Flack, F.D. Kinney, D.A. Lupyan, M.A. McFarland. 1987. Chapter 6: Admixtures, Cement Research Progress 1986. American Ceramic Society. Westerville, Ohio. pp. 139-181.

Widner, T.E., S.M. Flack, B.P. Caldwell, S. Feng, J.S. Hammonds. Historical releases of radionuclides from White Oak Creek to the Clinch River - An independent assessment of quantities released, off-site doses, and health risks. Abstract submitted and accepted for the Society for Risk Analysis annual meeting. December 7-10, 1997.

PROFESSIONAL ASSOCIATIONS:

Society for Risk Analysis (National and Local Chapters)
American Chemical Society, Environmental and Nuclear Chemistry Divisions
Rocky Flats Local Impacts Initiative, Risk Assessment Methodology Focus Group

SHAWN C. LEPPERT
Principal Hydrogeologist

EDUCATION AND PROFESSIONAL QUALIFICATIONS:

M.S. in Hydrology, New Mexico Institute of Mining and Technology,
Socorro, New Mexico, 1989

B.G.S. in Geology, New Mexico State University, Las Cruces, New
Mexico, 1986

Hydrogeologic analysis
Analytical and numerical modeling
Hydrogeochemistry
Geostatistics

Safety-Kleen 40-hour OSHA Hazardous Materials Health and Safety Training Course and Annual 8-Hour
HAZWOPER Refresher Course

Dissolved Organic Contaminants in Groundwater, Innovative Technologies for Site Characterization & Plume
Remediation. Waterloo Centre for Groundwater Research. April 1995

Multi-Phase Contaminant Transport Course. Taught by Jack Parker et al., Tampa Florida, December 1991

SPECIAL QUALIFICATIONS:

- 11 years of experience as a quantitative groundwater hydrologist.
- Extensive experience in the analysis of complex groundwater systems and the flow and transport of contaminants.
- Adept in developing remediation/control systems to address contaminated groundwater and the associated soil profile.
- Project experience includes design of detection monitoring systems, evaluation of remediation system effectiveness, remedial system design, and assessment of risk using fate and transport techniques.

RECORD OF EXPERIENCE:

Principal Hydrogeologist, Environmental Decision Group, Inc., a Safety-Kleen Company.

Specific Duties, Responsibilities and Assignments: As Principal Hydrogeologist, Mr. Leppert is responsible for identifying and applying practical hydrologic, hydrochemical, and statistical analysis methods to investigations of soil and groundwater impacted by a variety of contaminants. He also directs and reviews hydrogeological studies on numerous active projects. His contributions include the application of comparison statistics and evaluation of hydrochemical controls on fate and transport of contaminants. He is thoroughly versed in the use of current computer models used for fate and transport analysis, and has also designed project-specific models.

Technical Expert, Environmental Lawsuit

Served as lead hydrogeologist for defendant on case on federal court. Provided 8 hours of deposition and affidavits. Prepared court exhibits and graphics for testimony support. Assisted counsel in development of technical aspects of the case.

RCRA Investigation and Remedial Design, Hazardous Waste Landfill in Oklahoma. Conducted a RCRA Investigation, Interim Measures Investigation, and Corrective Measures Study on a release from a hazardous waste landfill cell in Oklahoma. A non-aqueous phase PCE was released into the shallow water bearing unit. Performed a detailed characterization including multiple long-term pump tests and packer testing. Conducted bench-scale batch tests and column studies to determine the appropriateness of zero-valent iron reduction technology. Placed a pumping well that hydrologically contains both the DNAPL and associated aqueous phase contaminants.

Probabilistic Contaminant Fate and Transport Analysis, RCRA Landfill, Ontario Canada. Developed a methodology for performing probabilistic contaminant fate and transport analyses using a Monte Carlo technique. Utilized a one-dimensional contaminant fate and transport simulator in the probabilistic analysis. Evaluated 89 different dissolved constituents, both inorganic and organic based species, for 6 different landfill designs, computing over 5 million simulations. Utilized a geochemical speciation simulator PHREQ-C to estimate the migration potential for inorganic species. Conducted various statistical simulations to quantify the certainty of the Monte Carlo analyses.

Control System, Transportation Client, Kansas. Designed a passive funnel-gate LNAPL remediation/control system for a railyard in Kansas. Project work included the development of a finely discretized, three-dimensional, multi-phase, numerical model to provide design information and to guide the placement of the system. Performed a detailed sensitivity analysis to qualify the design uncertainties.

Fate and Transport Model, Refinery Site, Oklahoma. Developed numerical and semi-analytical models to aid in the design of extensive petroleum hydrocarbon contamination remediation at a refinery in Oklahoma. Developed three-dimensional fate and transport models as well as two-dimensional, quasi-transient, semi-analytical capture zone models. The goal of the modeling analysis was to develop an approach to eliminate source free-phase hydrocarbons, to ascertain the extent of dissolved phase hydrocarbon, and to determine the health risk associated with the dissolved phase.

Evaluation of Remediation System Effectiveness. Developed and implemented a detailed groundwater natural gradient tracer test at a site with an existing groundwater and petroleum hydrocarbon remediation system to evaluate the system's effectiveness.

Groundwater Flow and Contaminant Transport Analysis, Potential Landfill Site, Mississippi. To assist in siting a hazardous waste landfill in Mississippi, completed a complex, detailed, cross-sectional numerical model to analyze groundwater flow and contaminant transport. The work included a two-phase calibration process and a wide range of sensitivity analyses.

Modeling Analysis, Railyard, Nevada. Completed a remedial design and post-audit numerical modeling analysis for a large railyard in Las Vegas. The detailed quasi three-dimensional model finely discretized approximately one square mile of the site. Conducted post-audit analyses for two existing hydrocarbon interceptor trench systems. Performed modeling analysis to quantify the effect that ongoing construction within the railyard had on hydrocarbon plume geometries. Designed groundwater remediation and control systems that diminished the effect of dewatering (for construction) on plume distributions.

Development of Statistical Analysis Methods. Developed a statistical package for quantifying hydrogeochemical changes in groundwater associated with detection monitoring. This package is currently used at most of Safety-Kleen's hazardous waste disposal facilities.

Fate and Transport Analysis, Wyoming. Completed a two-dimensional post-audit contaminant fate and transport analysis for an existing trench remediation system in Cheyenne.

Remediation Design Analysis, Texas. Completed a remediation design analysis for a petroleum hydrocarbon contaminated site in Irving. Analysis included the use of a multi-phase groundwater transport code and a capture zone code developed by Mr. Leppert.

Groundwater Remediation System Analysis, Nebraska. Completed a post-audit analysis of an existing pump-and-treat groundwater remediation system in Omaha. The analysis was performed using semi-analytical particle tracking techniques.

Salt Water Intrusion Analysis, Floridan Aquifer. Conducted an exhaustive analysis on the propensity for continued salt water intrusion of the Floridan Aquifer in Northwest Hillsborough County, Florida. Utilized numerous density dependent numerical codes to determine the most suitable discretization, boundary conditions, and model parameters. This work was presented to the public.

Well Head Protection Method Development. Developed and implemented well-head protection methods for public supply facility. Included analytical techniques, particle tracking, and numerical techniques.

EMPLOYMENT SUMMARY:

Environmental Decision Group, Inc., a Safety-Kleen Company, Boulder, Colorado. Principal Hydrogeologist, 1991-Present.

Southwest Florida Water Management District, Brooksville, Florida. Hydrologist II, 1990.

PUBLICATIONS AND PRESENTATIONS:

Leppert, S.C., 1994. *"Modeling The Future: The Role Predictive Groundwater Modeling Can Play in the Control and Remediation of Contaminants (abs)."* Presented at NGWA's 46th Annual Convention and Expo's Groundwater Remediation: Existing Technology and Future Direction Program, Las Vegas, Nevada.

Leppert, S.C., Jones, B.G., and Mast, M.K., 1994. *"Transient Five-Spot Injection Withdrawal In-Situ Soil and Groundwater Washing: Theoretical Development."* Proceedings for the International Ground Water Modeling Center's 1994 Modeling Conference, Fort Collins Colorado.

Leppert, S.C., Jones, B.G., Mast, M.K., and Slayman, B., 1993. *"Model Conceptualization: Uncertain Aspects of Model Development."* Proceedings for the International Ground Water Modeling Center's 1993 Modeling Conference, Golden, Colorado.

Leppert, S.C., Mast, M.K., 1992. *"Particle Tracking: An Effective Tool for Trench Remediation Analysis? A Case Study."* Proceedings of the 1992 Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Restoration, Houston, Texas.

Leppert, S.C., Jones, B.G., and Mast M.K., 1992. *"A Comparison of Precise Semi-Analytical Particle Tracking Techniques to Numerical Techniques in the Evaluation of Remediation Systems (abs)."* Presented at the Twelfth Annual American Geophysical Union's Hydrology Days.

Leppert, S.C. and Bengtsson, T., 1990. *"Comparison of Density-Coupled Transport Codes for a Saltwater Intrusion Study in Coastal West-Central Florida (abs)."* Presented at the American Geophysical Union's Fall Meeting, San Francisco, California.

Leppert, S.C., 1989. *"Capture Zones in Transient Flow Fields: Simulations and Analysis."* Thesis, New Mexico Institute of Mining and Technology, Socorro New Mexico.

Linderfelt, William R., Leppert, Shawn C., and Wilson, John L., 1989. *"Capture Zones for Well-Head Protection: Effect of Time Dependent Pumping, Saturated thickness and Parameter Uncertainty (abs)."* Presented at the American Geophysical Union's Fall Meeting, San Francisco, California.

Wilson, John L., Linderfelt, William R., and Leppert, Shawn C., 1989. *"The Influence of Streams, Barriers, Groundwater Divides and Other Hydrological Features on Well Capture Zones (abs)."* Presented to the 28th International Geological Congress, Washington, District of Columbia.

McLemore, V.T., North, R. M, and Leppert, S.C., 1988. *"Rare Earth Elements in New Mexico."* New Mexico Geology, volume 10(2), pp 33-38.

PROFESSIONAL ASSOCIATIONS:

American Geophysical Union
National Water Well Association
Association of Ground Water Scientists and Engineers
New Mexico Geological Society

KAY L. TAUSCHER
Project Geologist

EDUCATION AND PROFESSIONAL QUALIFICATIONS:

M.S. (Candidate) in Geology, University of Cincinnati,
Cincinnati, Ohio 1985

B.S. in Geology, University of Louisville, Louisville, Kentucky,
1983

Certified Professional Geologist; Indiana, Illinois, Tennessee, Wyoming, Wisconsin, and Kentucky
Safety-Kleen 40-Hour OSHA Hazardous Materials Health and Safety Training Course and Annual 8-Hour
HAZWOPER Refresher Course

Site characterization
Site assessments and investigations
Hydrogeological assessment and
design of recovery systems
Fate and transport analyses

SPECIAL QUALIFICATIONS:

- 13 years experience as a professional geologist/hydrogeologist.
- Manages site investigations, environmental assessments, and remedial investigations/feasibility studies (RI/FS).
- Designs and installs groundwater and soil remediation systems.
- Wide variety of technical field experience including installation and testing of monitoring/remedial wells, directing environmental drilling, and collecting soil and water samples.

RECORD OF EXPERIENCE:

Project Geologist, Environmental Decision Group, Inc., a Safety-Kleen Company.

Specific Duties, Responsibilities, and Assignments: Ms. Tauscher uses her 13 years of consulting and project management experience in hydrogeology and geology to provide pragmatic solutions to water resource and environmental issues, especially contaminant fate and transport analysis and contamination assessment. Her experience includes management and field investigations at industrial, RCRA, and CERCLA sites. She has extensive experience in remedial investigations/feasibility studies (RI/FS) for the U.S. Air Force and private industry. Ms. Tauscher has managed site assessments and hydrogeologic investigations at railroad yards, natural gas compressor stations, manufacturing facilities, and landfills in addition to managing Phase I assessments for real estate transactions. Additionally, she has performed a wide variety of technical field activities, including installing monitoring wells, performing aquifer testing, collecting soil and water samples, and directing a variety of remediation projects.

Projects have involved groundwater and soil contamination assessment and remediation; monitoring and remediation well design and installation; aquifer testing and analysis; contaminant fate and transport analysis; health risk assessment; subsurface investigations at RCRA, CERCLA, solid waste, UST and railroad facilities, and karst environments; environmental sampling and chemical data evaluation; Phase I environmental site assessments; and negotiations with state and federal regulatory authorities.

President and Senior Geologist, The Glacier Group, Inc. *Specific Duties, Responsibilities, and Assignments.* Provided senior technical guidance and review for all project work. Responsible for primary client communication, marketing, and personnel management.

Closure of a Research and Development Facility, Barrington, Illinois. Designed and managed closure activities for a large national industrial client's R & D facility.

Site Characterization and RBCA Evaluation for Chemical Plant, Forrest Park, Illinois. Provided technical lead and managed site characterization, hydrogeological assessment, and RBCA evaluation of a 50 year old chemical manufacturing facility for a large national industrial client.

Hazardous Waste Removal at Steel Fabrication Facility, Chicago, Illinois. Managed and oversaw the characterization, handling, and disposal of over 100 drums and containers of hazardous waste at a steel plant in Chicago.

Closure and Remediation at Industrial Facility, Cloquet, Minnesota. Provided technical lead and managed RCRA remedial action for closure at the facility. Activities involved preparation of bid specifications and the design and operational oversight of a groundwater extraction and treatment system for removing chlorinated solvents. Included interaction and meetings with the Minnesota Pollution Control Agency (MPCA).

RCRA Clean Closure at Industrial Facility, Burnsville, Minnesota. Provided oversight and project management of a RCRA clean closure remedial action involving adsorbed chlorinated solvents for an industrial client. Activities included interaction with the MPCA for receipt of clean closure approval.

Designed and managed numerous site assessments at petroleum impacted UST facilities

Conducted and evaluated data from several pilot tests for standard groundwater pumping and dual phase extraction.

Prepared bid specification packages, designed and oversaw installation of many dual-phase extraction remedial systems utilizing a liquid ring pump extraction and a variety of treatment systems.

Operations Director, Earth Science Technologies. *Specific Duties, Responsibilities, and Assignments.* Responsible for client development in the Midwest Region, provided senior technical guidance and review, and managed personnel for the region. Managed multiple UST projects, including tank removals, investigations of leaking USTs, and corrective action for UST sites. Actively involved in reimbursement application process in Michigan, Illinois, Wisconsin, and Indiana for present clients.

Project, Field Staff, and Senior Geologist/Hydrogeologist, Manager of the Hydrogeology Group, Dames and Moore. *Specific Duties, Responsibilities, and Assignments.* Assisted in hydrogeologic investigation at a CERCLA facility of chlorinated solvents in the city groundwater wells in Clare, MI. Included the analysis of pumping test data on the city well, installation of monitoring wells and on-site GC analysis of groundwater samples. Reviewed risk assessment prepared for the site to evaluate health risk associated with the concentrations of chlorinated solvents present in groundwater.

Managed Phase II hydrogeologic investigation and groundwater monitoring program for a paper industry waste water spray field in Central Ohio. Negotiated with state agency regarding investigation procedures and future monitoring plan.

Managed and assisted in the design of a four-phased site contamination assessment and remediation of an abandoned railyard in Chicago, IL. Developed risk assessment and established risk-based cleanup criteria for site.

Designed and managed several contamination assessments of railyards in Minnesota, Illinois, Wisconsin, and Texas.

Performed several geophysical surveys using magnetometers and electromagnetometers to identify landfill boundaries, underground storage tanks, and other subsurface boundaries at RCRA and non-regulated facilities.

Oversight of onshore and offshore drilling and geotechnical field investigations at a utility facility in Ashtabula, OH.

Completed several reevaluations of Hazard Ranking Scores for large industrial clients, whose sites had been proposed for addition to the National Priorities List.

Conducted and managed all aspects of RCRA RI/FS hydrogeologic site investigations on U.S. Air Force facilities in Anchorage and Fairbanks, Alaska.

Managed project investigation and remediation design for landfill in central Indiana containing adsorbed and dissolved chlorinated hydrocarbons.

Conducted and analyzed a pumping test on a bedrock aquifer at an industrial facility with chlorinated organic contaminants.

Designed and managed several hydrogeologic investigation at an industrial facility in Harvard, IL: using HydroPunch technology and an onsite gas chromatograph.

Responsible for the creation, coordination, and management of a UST management system for a large industrial client based in Cincinnati, Ohio. Identified each UST at facilities and created a tank and content characterization for each site. Ranked the sites by risk based upon key factors. Created a reference document for the client summarizing this information, local potential points of impact, and action items to minimize future potential impact.

Conducted field hydrogeologic investigation to monitor leachate from client's landfill. The work included conducting packer testing on geologic bedrock formations to assess hydraulic conditions. Analyzed data to assess potential off-site migration.

Conducted and managed investigation and remediation of shallow soils saturated with PCBs at a contaminated utility site that had been used to recycle transformers in Mentor, Ohio.

EMPLOYMENT SUMMARY:

Environmental Decision Group, Inc., *a Safety-Kleen Company*, Boulder, Colorado. Project Geologist, 1998-Present.

The Glacier Group, Inc. Evanston, Illinois. President and Senior Geologist, 1994-1998.

Earth Science Technologies (now ENSA), Midwestern Region, Operations Director, 1992-1994.

Dames and Moore, Inc. Cincinnati, Ohio and Chicago, Illinois. Staff, Project, and Senior Geologist, 1985-1992. Manager of Hydrogeology Group, 1989-1992.

PROFESSIONAL ASSOCIATIONS:

National Groundwater Association (Member)

EDWIN ULLMER
Geologist II

EDUCATION AND PROFESSIONAL QUALIFICATIONS:

B.A., Geology/Liberal Arts, Upsala College, East Orange,
New Jersey, 1963

M.S., Geology, University of Arizona, Tucson, Arizona, 1974

M.Ed., Phil. of Education, University of Arizona, Tucson, 1972

Professional Geologist, Wyoming #0663

Certified Environmental Manager, Nevada #EM-1203

Certified UST Consultant, Utah #CC0096; Certified Sampler, Utah #GS0270

Safety-Kleen 40-Hour OSHA Hazardous Materials Health and Safety Training Course and Annual 8-Hour
HAZWOPER Refresher Course

Safety-Kleen 8-Hour Supervisor's Training Course

Special Training in Geochemistry, Geophysics, and Photogeology

Geologic/hydrogeologic investigations
Site assessment and remediation
Project management
Regulatory compliance

SPECIAL QUALIFICATIONS:

- Environmental experience includes performing site characterizations, geologic assessments, and risk assessments; evaluating hydrologic processes, contaminant migration, and geochemical parameters; and developing remediation strategies and overseeing implementation.
- Provided project management, team leadership, and supervision for all phases of assessment and remediation, project design, and compliance-regulatory issue resolution.
- Performed geologic mapping and structural analysis from stereo-aerial photography and Landsat imagery for petroleum and mineral exploration. In the environmental sphere, used aerial photography for site studies, geologic and hydrologic evaluations, and archival studies.
- 25 years of experience as professional geologist in environmental geology and hydrology, mineral exploration and mining, and photogeology and Landsat image interpretation. Experience in a variety of geomorphologic settings including geologic evaluations of highly weathered terrains involving saprolite and laterite alteration, glaciated landscapes, desert landforms, and fluvial drainages and shorelines

RECORD OF EXPERIENCE:

Geologist II, Environmental Decision Group, Inc. a Safety-Kleen Company.

Specific Duties, Responsibilities, and Assignments: Supervise, manage, and perform all phases of assessment on diverse hydrocarbon and metal-contaminated sites. Experience includes both soil and groundwater investigations and remediation. Duties include preparing bids and work plans, overseeing health and safety, performing data collection, data analysis, and reporting, resolving regulatory issues, and interacting with clients and regulators. Field assignments include supervising field crews and contractors performing sampling, mapping, and facility maintenance. Representative projects and accomplishments are described below.

Public Service of Colorado, Denver, Colorado. Conducted drilling and sampling for PCBs and lead and created vertical and horizontal profiles of contaminant analytes for locating limits of soil remediation. The site was a former salvage yard covering about 5 city blocks. Soil remediation based on discriminating contaminated soil lifts within grids using results of soil boring sample analysis and stratigraphic observations.

Union Pacific Railroad, LUST projects, Western States. Managed and participated in all phases of the UST management program including tank removal, site investigation, soil remediation, groundwater remediation, reporting, permitting, notification, and regulatory compliance. Managed the investigation and remediation of LUST sites in several states with differing regulatory structures. Successfully closed numerous sites, and initiated, petitioned, and received the reimbursement for the client of a large percentage of the monies spent on LUST investigations and remediation in Nebraska.

Union Pacific Railroad, Kellogg, Idaho Superfund Site. Evaluated lead contamination on UPRR property resulting from mining and smelting activities. Established dispersion patterns and mechanisms, as well as lead speciation, to discriminate lead contamination distributed during rail transport activities from dispersion caused by smelting.

Union Pacific Railroad, North Platte, Nebraska Railyard. Established diesel free product and dissolved analyte concentrations and limits in groundwater at three large refueling centers in the railyard. The assessment was carried out by geoprobe real-time analysis followed by soil borings and monitor well installation.

Safety-Kleen, Lone Mountain, Oklahoma Transfer Site. Performed geologic site characterization for a rail transfer station for hazardous waste. Geologic investigation around the site corrected a geologic mapping error that existed on previously published maps. The transfer station was permitted based on the new data.

Safety-Kleen, Clive, Utah Groundwater Exploration. Successfully identified aquifers and located wells that provide adequate fresh and industrial water supplies for a hazardous waste incinerator in the Salt Lake desert.

Safety-Kleen ECDC Waste Facility, Utah Bentonite Assessment. Estimated strippable bentonite clay reserves on private and BLM land near the ECDC facility. The bentonite is to be used for cell liner material.

Union Pacific Resources, Patrick Draw Gas Refinery, Wyoming Free Product Assessment. Mapped and interpreted the free product accumulation in three overlying confined and unconfined aquifers at the refinery. Participated in planning the recovery of the free product.

EMPLOYMENT SUMMARY:

Environmental Decision Group, Inc., a *Safety-Kleen Company*, Boulder, Colorado. Geologist II, 1995 to Present and 1989-1994.

Geological Data Systems, Inc., Denver, Colorado. Photo and Image Geologist, 1994-1995. Produced geologic maps from aerial photography, Landsat images and other remote sensing data for petroleum and mineral exploration.

Consultant and Contract Geologist, Denver, Colorado; Nevada; some international, 1985-1989. Performed gold exploration and photogeological mapping for various companies.

Rocky Mountain Energy Company, Denver and other cities. Mineral Exploration Geologist, 1976-1985. Performed uranium and other commodity exploration and development, carried out all phases of geologic investigation.

Various Mining Companies in USA and international. Mineral Exploration Geologist, 1965-1975. Performed base metal, precious metal, and diamond exploration, and carried out all phases of geologic investigation and mining.

PUBLICATIONS AND PRESENTATIONS:

Ullmer, E. "Results of Exploration for Unconformity-Type Uranium Deposits in East Central Minnesota," *Economic Geology*, Vol. 80, No. 5, 1985.

Ullmer, E. "An Early Proterozoic Phosphate Occurrence in East-central Minnesota in 1981", *Newsletter of the International Geological Correlation Programme*, United Nations Project 156.

Ullmer, E. "Precambrian Iron-rich Pods and Uranium Mineralization Near Warm Spring Creek, Wyoming," *Contributions to Geology*, Vol. 22, No., 2, 1983.

Currently writing a textbook on photogeology.

PROFESSIONAL ASSOCIATIONS:

Society of Economic Geology, Full Member.

DONALD KNUDSEN WARD
Environmental Scientist

EDUCATION AND PROFESSIONAL QUALIFICATIONS:

M.S. in Environmental Health Science, University of Michigan,
Ann Arbor, Michigan, 1997

B.A. in Environmental Studies, University of Michigan-Dearborn,
Dearborn, Michigan, 1989

Safety-Kleen OSHA 40-Hour Hazardous Materials Health and Safety Training and Annual 8-Hour Refresher

Risk assessment
Emission characterization
Dispersion modeling
Media sampling

SPECIAL QUALIFICATIONS:

- 4 years of experience in project management, environmental investigations, emissions characterization, and sample collection.
- 3 years experience as a senior chemist and 3 years experience as a chemist analyzing and interpreting raw laboratory data.
- Proficient at using computer modeling techniques for effluent dispersion and contaminant fate and transport.

RECORD OF EXPERIENCE:

Environmental Scientist, Environmental Decision Group, Inc., a Safety-Kleen Company.

Specific Duties, Responsibilities, and Assignments: Mr. Ward serves as project manager and team leader for source sampling projects. He is responsible for writing proposals, BIDs, and development of new projects. He writes and reviews standard operating procedures (SOPs) for air sampling methodologies.

Project Manager, Automotive Company, Michigan.

Managed project that evaluated emissions of surfactants from four automobile manufacturing facilities. Selected appropriate testing methodologies, supervised field operations, and prepared reports for client. Selected appropriate test method and sampling protocol for mineral oil mist and ethylene oxide determination from exhaust stacks at auto manufacturing facility. Evaluated gas chromatography/mass spectrometry (GC/MS) data to confirm the presence of oil mist in stack emissions.

Project Manager, Industrial Facility, Michigan. Developed test plan to characterize emissions from chemical batch reactor processes. Testing involved the use of non-routine sampling methodologies. Modified and combined sampling methods to effectively characterize emissions. Performed evaluation of results with respect to emissions limits for similar sources.

Project Manager, Industrial Facility, Michigan.

Prepared and submitted test protocol to Michigan Department of Environmental Quality (MDEQ). Supervised sampling of thermal oxidizer destruction efficiency testing. Wrote and submitted report to MDEQ for compliance with consent order for installation of a thermal oxidizer to reduce volatile organic compounds (VOCs) emissions.

Project Scientist, Hazardous Waste Incinerator, Texas.

Evaluated incinerator ash residue data employing fate and transport modeling and risk assessment techniques to determine direct ingestion and dermal exposure pathway risks. Several disposal scenarios of the incinerator ash were evaluated based on EPA Region VI guidelines for delisting petitions. Performed field sampling and report writing for emission testing of engineering test evaluations for a powered activated carbon injection system designed to remove dioxins and furans and mercury from hazardous waste

incinerator stack emissions. Performed dispersion modeling of incinerator emissions for screening level risk evaluation. Performed field sampling and report writing for emission testing of a prototype particulate emission control device at a hazardous waste incinerator. Testing used to determine efficiency of new pollution control device to meet MACT standards for particulate emissions.

Project Scientist, Hazardous Waste Incinerator, Kansas. Analyzed and summarized historical data on incinerator ash constituents. Contributed to sample and analysis plan for petition to delist ash from hazardous designation. Tabulated and summarized results of sampling in support of the petition.

Project Scientist, Commercial Landfill, Colorado.

Developed and implemented spreadsheets to perform groundwater statistics analysis and to summarize data. Coordinated staff in absence of project manager to assemble and complete draft annual groundwater report in preparation for submission to the State of Colorado.

Project Scientist, Industrial Facility, Michigan.

Developed spreadsheets employing ASTM method E 1739-95 risk based corrective action applied at petroleum sites. Assessed data and prepared forms for submittal to MDEQ.

Project Scientist, Manufacturing Facility, Michigan.

Defined parameters and setup MT3D to model subsurface movement of PCE released from a manufacturing facility. Contributed to section of report describing modeling process.

Project Scientist, Transfer and Disposal Facility (TSDF), New Jersey.

Modeled dispersion of VOCs from TSDF and performed risk assessment for exposure to airborne VOCs of employees and residents. Modeled effect of tank ruptures and spill of hazardous material and distance of danger zones for storage tanks and transportation spills of hazardous materials. Wrote section on ambient air quality for Environmental Health and Impact Statement.

Project Scientist, Cement Production Facility, Michigan.

Developed soil sampling plan for detecting metals from a cement kiln burning hazardous waste. Compiled data and reviewed documents related to legal cases involving cement kilns.

Senior Chemist, Safety-Kleen (Encotec), (6/93 - 2/96).

Supervised analytical chemists performing gas chromatography (GC) analysis. Trained chemists in analysis of pesticides and PCBs by GC. Reviewed work of junior chemist for accuracy, correctness, and adherence to QA/QC guidelines. Member of company safety committee; wrote standard safety procedures for chemical hygiene plan and investigated and wrote summary report of chemical spills within laboratory.

Chemist, Safety-Kleen (Encotec), (10/89 - 6/93).

Analyzed pesticides and PCBs by gas chromatography using SW-846 method 8080. Wrote SOP for identification and quantification of PCBs. Responsible for the organic extraction, concentration, derivation, and cleanup of soil, water, and waste samples for pesticide, herbicide, and base-neutral acid analysis by SW-846 and EPA contract laboratory program methodologies.

EMPLOYMENT SUMMARY:

Environmental Decision Group, Inc., a *Safety-Kleen Company*, Ann Arbor, Michigan. Environmental Scientist, 1996-present. Senior Chemist 1993 - 1996. Chemist 1989 - 1993.

USFS Rocky Mountain Forest and Range Experimental Station, Laramie, Wyoming. Research Assistant 1989.

PROFESSIONAL ASSOCIATIONS:

American Chemical Society, Member.

Air and Waste Management Association, Member.

PUBLICATIONS AND PRESENTATIONS:

Mehta, J., Ward, D.K., Ardizinski, E., and Ullrich, C.R., *Measurement and Control of Dioxins and Furans from a Hazardous Waste Incinerator*, A&WMA 90th Annual Conference, June 1997, Pittsburgh, Pennsylvania.

APPENDIX G

Standard Operating Procedures



ENVIRONMENTAL
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Field Testing - pH Measurements

Environmental Decision Group, Inc. SOP Number 5 (A)

Revision Number - 3

Date - January 13, 1999

THEORY

A pH unit describes the extent of acidity or alkalinity for an aqueous solution expressed in quantitative terms on a scale of 0 to 14. It is defined as:

$$pH = - \text{Log} [H^+]$$

In any aqueous solution at a temperature of 25°C, $[H^+]$ (the hydrogen ion concentration) and $[OH^-]$ (the hydroxyl ion concentrations) will total to 10^{-14} moles / liter. For a given aqueous solution (at 25°C), if the hydrogen ion concentration is greater than the hydroxyl ion concentration, the pH of that solution is less than 7 and the material is acidic. Conversely, if the hydrogen ion concentration is less than the hydroxyl ion concentration, the pH of that solution is greater than 7 and the material is basic or alkaline.

An electronic pH measurement system consists of a measuring electrode, a reference electrode and an electrical resistance meter. The pH measuring electrode is a glass bulb sensitive to hydrogen ion concentrations. Its resistance to the flow of electricity will change with the hydrogen ion concentration in contact with the bulb. The reference electrode's electrical resistance does not change with the pH of the solution. The electrical resistance meter measures these two resistance values, and presents to the user a value for the test solution's pH.

pH meters are temperature sensitive, i.e. the resistance of the electrodes changes with temperature. A correction factor is applied to the readout, so that all readings are converted to the value expected at 25°C.

SUMMARY

This Standard Operating Procedure (SOP) describes the field method for obtaining pH measurements in fluid samples. Prior to sampling, a calibrated pH meter is used to determine the pH of waters during well purging. A two point calibration is used to determine instrument accuracy. The results are temperature compensated to 25°C.



EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ pH Meter
- ___ saturated KCl solution
- ___ PPE dictated in the site health and safety plan
- ___ logbook or field data sheets
- ___ solvent-free pens and markers
- ___ sample containers, such as jars or beakers
- ___ saturated solutions buffered to pH 4, 7, and 10
- ___ pH meter manual supplied by vendor

PROCEDURE

Calibration procedures vary from meter to meter. Follow the directions in the respective manuals for specific instructions. The following represents the general procedure for measuring pH.

- A. In this procedure, two buffer solutions of different pH values are utilized. For best accuracy, fresh buffer solution should be used. Never pour used buffer solutions back into the bottle. The pH meter must be recalibrated at the beginning of each batch of determinations. If available, a magnetic stirrer can be used to stir the solution.
1. In any combination, calibrate to pH 4, 7, or 10. For best accuracy, calibrate to at least two pH units at the temperature of the test solution. (If the site to be tested has a known high water pH, use solutions 7 and 10; for known low pH, use 4 and 7.)
- B.
2. Immerse the electrode(s) into pH 7.0 buffer and turn ON the pH meter. Measure the temperature of the buffer solution and set the temperature control to this value.
 3. Following the specific calibration instructions, adjust the CALIBRATION control until the readout displays pH 7.0 while stirring gently.
 4. Remove the electrodes from the buffer and rinse with deionized water to prevent carryover of the buffer.
 5. Immerse the electrodes into either pH 4.0 buffer for acidic solutions or pH 10.0 buffer for alkaline solutions.
 6. Adjust the slope until the readout displays either pH 4.0 or 10.0.
 7. Raise the electrode(s), rinse with deionized water and immerse into the sample solutions. Adjust the temperature control to the temperature of the sample. Allow the reading to stabilize before recording the value.
 8. After measurement, raise and rinse the electrode. Keep the electrodes immersed in pH 7.0 buffer when not in use.



9. Record all data in field logbook or data sheet according to Table 1.
10. If water samples contain oil, dip the electrode in isopropyl alcohol to clean away residues.
11. If the pH unit yields a slow response, coatings on the electrodes can be removed by dipping in 0.1N HCL, followed by distilled or deionized water, and another bath of 0.1N NaOH followed by distilled or deionized water.

Troubleshooting:

1. If probe is turned on and the electrode is submersed and there is still no reading, check to see if the cap has been removed from the probe.
2. Direct sunlight on the display panel for longer than approximately 10 minutes may "fry" the display panel so that nothing can be read on the panel. If this happens, place probe in a shaded area for a while and the panel should become legible again.
3. If moisture gets into the display panel area it could "fry" the display. Place the probe in a dry, controlled environment. Thoroughly dry the outside of the instrument. Remove the top where the batteries are located and leave it open for a length of time, perhaps on the dashboard of the field vehicle or overnight. This allows the inside of the instrument to dry out and the display may work again. If too much moisture is inside the instrument, the probe must be replaced.
4. Extreme temperatures effect the operation of pocket probes. If the instrument gets too hot or cold the probe will not function. If this happens, place the probe in a dry, controlled environment and allow the instrument to warm up or cool off accordingly. Optimal operating temperature for the pocket probes is 0-50°C, (32-122°F).
5. If the display panel suddenly does not work and the instrument does not appear to be affected by temperature or moisture, the batteries may have become low. Replace the batteries in the top of the instrument.
6. If readings suddenly appear abnormal, (e.g. normal site readings are 7-8 pH then suddenly a reading of 2-3 pH is made) check the glass bulb on the end of the probe. These bulbs are easily broken. If the bulb is broken, the probe must be replaced.
7. If at all possible, have backup pocket meters on-site.
8. Symptoms usually related to buffers are: inaccurate readings or a 2-point calibration cannot be performed. Check for ages or contaminated buffers by substituting fresh ones.



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9. Symptoms usually related to operator error are: offscale reading, noise, inability to perform a 2-point calibration, and inaccuracies of reading. Check for the following common operator errors:
 - a. Electrodes are not plugged into the proper terminals and are not seated firmly.
 - b. The calibration of the meter is not performed according to the operating instructions outlined in the Instruction Manual.
 - c. The meter calibrated in the wrong buffer.
 - d. The reference electrode has not been filled.

REFERENCE

APHA - AWWA - WPCF, 1989, Standard Methods for the Examination of Water and Wastewater



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Field Testing - Temperature Measurements

Environmental Decision Group, Inc. SOP Number - 5 (B)

Revision Number - 2

Date - January 13, 1999

THEORY

Thermal activity is associated with every sample. The solubility of contaminants in water can be affected by temperature. Therefore, temperature readings must be obtained prior to monitoring well sampling and during sample collection as a quality assurance measure.

SUMMARY

This Standard Operating Procedure (SOP) describes the field method for obtaining temperature measurements in fluid samples. It is important that several temperature measurements be obtained prior to sampling in order to assess the stability of the fluid temperature.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ Cole Parmer Thermometer (thermocouple) or equivalent **NOTE: DO NOT USE A MERCURY THERMOMETER**
- ___ PPE dictated in site health and safety plan
- ___ logbook or field data sheets
- ___ solvent free pens and markers
- ___ sample containers
- ___ distilled or deionized water

PROCEDURES

1. Remove cap from temperature probe.
2. Turn on temperature probe.
3. Rinse the temperature probe with distilled or deionized water.
4. Rinse sample container thoroughly with sample and dispose of water.
5. Obtain aqueous sample.
6. Immerse the temperature probe in the sample container containing aqueous sample.
7. Allow the display to stabilize.
8. Record all data in field logbook or data sheet according to Table 1.



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Table 1: Temperature Probe Information

Date	Time	Name	Reading	Comment

9. Clean the unit by rinsing in distilled or deionized water.
10. If water samples contain oil, dip the unit in isopropyl alcohol to can clean away residues.
11. If temperature probe is turned on and the probe is submersed and there is no reading, check to see if the cap has been removed from the probe.

REFERENCE

APHA - AWWA - WPCF, 1989, Standard Methods for the Examination of Water and Wastewater

Field Testing - Specific Conductance(Conductivity)

Environmental Decision Group, Inc. SOP Number - 5 (C)
Revision Number - 3
Date - January 13, 1999

THEORY

Conductivity is a numerical expression of the ability of an aqueous solution to carry an electric current. This ability depends on the presence of ions, the total concentration of ions, ion mobility, valence, relative concentrations, and temperature. Solutions of most inorganic acids, bases, and salts are relatively good conductors. Conversely, molecules of organic compounds that do not dissociate in aqueous solutions conduct a current very poorly, if at all.

The standard unit of electrical resistance is the ohm. The standard unit of electrical conductance is the ohm's inverse, the mho, or the recently adopted Siemen. Specific conductance is measured as the conductance or resistance between two 1cm square electrodes placed 1 cm from each other, and is generally reported as micromhos/cm ($\mu\text{mho/cm}$) or microSiemens ($\mu\text{s/cm}$). A conductance cell and a Wheatstone bridge are the components of the apparatus used to measure conductance. A solution of potassium chloride of known specific conductance at the same temperature of the sample to be analyzed is used to calibrate the apparatus. Specific conductance varies directly with temperature, and is conventionally reported at 25°C.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ conductivity meter, preferably temperature corrected to 25°C
- ___ calibration standard solution, 1,100 mg/L KCL or equivalent
- ___ PPE dictated in site health and safety plan
- ___ logbook or field data sheets
- ___ solvent-free pens and markers
- ___ sample containers
- ___ distilled or deionized water

PROCEDURES

A. Calibration:

1. Select a calibration standard appropriate for the conductivity probe. When selecting a standard, it is best to use a standard which has a similar chemical makeup as the test solution. Table 2 in the notes shows the conductivity of common KCl calibration standards.
2. Following the manufacturer's directions, turn the conductivity ON.
3. Immerse the probe 1/2 to 1 inch into standard solution.



4. Stir gently and allow the instrument to stabilize. (Note: Temperature has a direct effect on conductivity readings. As the temperature of the sample rises, the conductivity rises.)
5. The meter should read the standard solution in which the probe is immersed. If it does not, keep the probe in solution and adjust the reading by following the manufacturer's directions.
6. Rinse electrode with distilled or deionized water.
7. Repeat the calibration if the ambient temperature changes by more than 10EF
8. Record all data in field logbook or data sheet according to Table 1.

Table 1: Conductivity Information

Date	Time	Name	Reading	Comment

B. Conductivity Measurement:

1. Rinse electrode and sample container with deionized water. Dispose of water.
2. Obtain aqueous samples using appropriate methods.
3. Rinse electrode with sample. Dispose of rinsate.
4. Rinse the sample container with sample and dispose. Refill sample container with sample.
5. Turn on the meter and immerse the probe 1/2 to 1 inch in the sample container containing aqueous sample.
6. Stir once and allow the display to stabilize.
7. Record all data in field logbook or data sheet according to Table 1.
8. If water samples contain oil, dip the electrode in isopropyl alcohol to clean away residues.
9. If the unit yields a slow response, coatings on the electrodes can be removed by dipping in 0.1N HCL, followed by distilled or deionized water, and another bath of 0.1N NaOH followed by distilled or deionized water.
10. Store the probe after rinsing in pH 4 saturated KCL solution or saturate absorbent materials, p pack around bulb and replace cap.



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NOTES

1. Standard, reference, and sample solutions must be at the same temperature.
2. Samples containing suspended material should be filtered through a 0.45 micron millipore filter prior to measurement.
3. The dissolved residue in a water sample may be estimated by multiplying the specific conductance in micromhos/cm by a factor which represents the ratio of the dissolved residue (determined by chemical analysis)/ to the specific conductance. The factor can vary from 0.55 to 0.75 depending upon the sample.

Table 2: Conductances of Potassium Chloride Solutions at 25°C

Concentration M	Conductance (µmho/cm)	
	Equivalent	Specific
0	149.85	
0.0001	149.43	14.94
0.0005	147.81	73.9
0.001	146.95	147.0
0.005	143.55	717.8
0.01	141.27	1413.0
0.02	138.34	2767.0
0.05	133.37	6668.0
0.1	128.96	12900.0
0.2	124.08	24820.0
0.5	117.27	58640.0
1	111.87	111900.0

REFERENCE

APHA - AWWA - WPCF, 1989, Standard Methods for the Examination of Water and Wastewater

Cole Parmer, Box instructions for full readout pocket size TDS and Conductivity Testers.

Field Testing - Dissolved Oxygen Membrane Electrode Method

Environmental Decision Group, Inc. SOP Number - 5 (D)
Revision Number - 1
Date - April, 1998

THEORY

Dissolved oxygen (DO) levels in natural and wastewaters depend on the physical, chemical, and biochemical activities in the water body. The analysis for DO is a key test in water pollution and natural attenuation processes.

Two methods for DO analysis are commonly used: the Winkler or iodometric method and its modifications and the electrometric method that uses membrane electrodes. The iodometric method is a titrimetric procedure based on the oxidizing property of DO. The membrane electrode procedure is based on the rate of diffusion of molecular oxygen across a membrane. The choice of test procedure depends on the interferences present, the accuracy desired, and in some cases convenience or expedience.

GENERAL DISCUSSION

Various modifications of the iodometric method have been developed to eliminate or minimize effects of interferences; nevertheless, the method still is inapplicable to a variety of industrial and domestic wastewaters. Moreover, the iodometric method is not suited for field testing and cannot be adapted easily for continuous monitoring or for in-situ DO determinations.

Polarographic methods that use the dropping mercury electrode or the rotating platinum electrode are not always reliable DO analysis in domestic and industrial wastewater because impurities in the test solution can cause electrode poisoning or other interferences. These problems can be minimized by using membrane-covered electrode systems in which the sensing element is protected by an oxygen-permeable plastic membrane that serves as a diffusion barrier against impurities. Under steady-state conditions the current is directly proportional to the DO concentration. Fundamentally the current is directly proportional to the activity of molecular oxygen.

Membrane electrodes of the polarographic and galvanic types have been used for DO measurements in lakes, reservoirs, for stream survey, control of industrial effluents, for continuous monitoring of DO in activated sludge units, and for estuarine and oceanographic studies. Because they are completely submersible, membrane electrodes are suited for in-situ analysis. Their portability and ease of operation and maintenance make them particularly convenient for field applications. In laboratory investigations, membrane electrodes have been used for continuous DO analysis in bacterial cultures including the BOD test.



Membrane electrodes provide an excellent method of DO analysis in polluted waters, highly colored waters, and strong waste effluents. They are recommended for use under conditions that are unfavorable for use of the iodometric method, or when that test and its modifications are subject to serious errors caused by interferences.

- a. Principle:* Oxygen-sensitive membrane electrodes of the polarographic or galvanic type are composed of two solid metal electrodes in contact with supporting electrolyte separated from the test solution by a selective membrane. The basic difference between the galvanic and the polarographic systems is that in the former the electrode reaction is spontaneous (similar to that in a fuel cell), while in the latter an external source of applied voltage is needed to polarize the indicator electrode. Polyethylene and fluorocarbon membranes are used commonly because they are permeable to molecular oxygen and are relatively rugged.

Membrane electrodes are commercially available in several varieties. In all of these instruments, the "diffusion current" is linearly proportional to the concentration of molecular oxygen. The current can be converted easily to concentration units (e.g., milligrams per liter) by a number of calibration procedures.

Membrane electrodes exhibit a relatively high temperature coefficient largely due to changes in the membrane permeability. The effect of temperature on the electrode sensitivity, ϕ (microamperes per milligram per liter), can be expressed by the following simplified relationship:

$$\log \phi = 0.43 mt + b$$

where:

- t = temperature, degrees C
- m = constant that depends the membrane material, and
- b = constant that largely depends on membrane thickness.

If values of ϕ and m are determined for one temperature (ϕ_0 and t_0), it is possible to calculate the sensitivity at any desired temperature (ϕ and t) as follows:

$$\log \phi = \log \phi_0 + 0.43 m (t - t_0)$$

Nomographic charts for temperature correction can be constructed easily and are available from some manufacturers. Check one or two points frequently to confirm original calibration. If calibration changes, the new calibration should be parallel to the original provided that the same membrane material is used.

Temperature compensation also can be made automatically by using thermistors in the electrode circuit. However, thermistors may not compensate fully over a wide temperature range. For certain applications where high accuracy is required, use calibrated nomographic charts to correct for temperature effect.



To use the DO membrane electrode in estuarine waters or in wastewaters with varying ionic strength, correct for effect of salting-out on electrode sensitivity. This effect is particularly significant for large changes in salt content. Electrode sensitivity varies with salt concentration according to the following relationship:

$$\log \phi_s = 0.43 m_s C_s + \log \phi_o$$

where:

ϕ_s, ϕ_o = sensitivities in salt solution and distilled water, respectively,

C_s = salt concentration (preferably ionic strength), and

m_s = constant (salting-out coefficient).

If ϕ_o and m_s are determined, it is possible to calculate sensitivity for any value of C_s . Conductivity measurements can be used to approximate salt concentration (C_s). This is particularly applicable to estuarine waters.

- b. Interference:* Plastic films used with membrane electrode systems are permeable to a variety of gases besides oxygen, although none is depolarized easily at the indicator electrode. Prolonged use of membrane electrodes in waters containing such gases as hydrogen sulfide (H_2S) tends to lower cell sensitivity. Eliminate this interference by frequently changing and calibrating the membrane electrode.

APPARATUS

YSI Model 55 handheld dissolved oxygen and temperature system, or equivalent.

The following describes the maintenance, calibration and operation of the YSI Model 55 system. If other systems are used, the manufacturer's instructions should be followed.

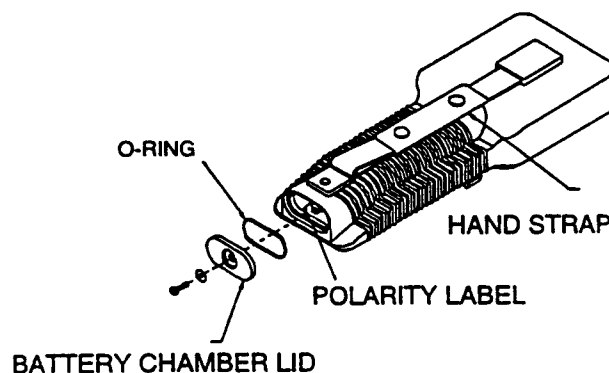
Preparing The Meter

Batteries

There are a few things you must do to prepare your YSI Model 55 for use. First, locate the six AA-size alkaline batteries which were included. Use a screwdriver or a small coin to remove the thumbscrew on the bottom of the instrument. This thumbscrew holds the battery-chamber cover in place. The battery-chamber cover is marked with the words "OPEN" and "CLOSE."

NOTE: On some models, the battery cover thumbscrew may be unscrewed by hand (a screwdriver may not be required).

There is a small label inside each of the two battery-chamber sleeves. These labels illustrate the correct way to install the batteries into each sleeve of the battery-chamber.



NOTE: It is very important that the batteries be installed **ONLY** as illustrated.
The instrument will not function if the batteries are installed incorrectly.

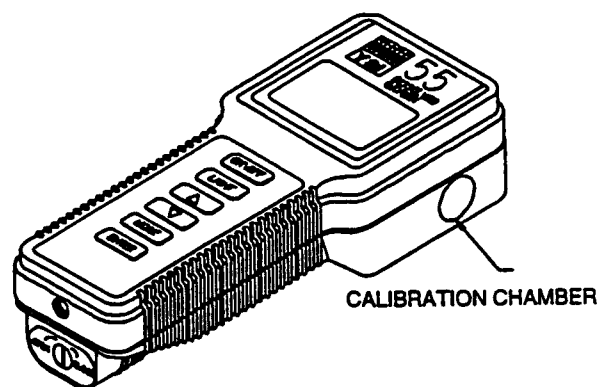
Turn the instrument on by pressing and releasing the ON/OFF button on the front of the instrument. The liquid crystal display (LCD) should come on. If the instrument does not operate, consult chapter 7. *Troubleshooting*.

NOTE: The information on the display will be meaningless since the probe has not yet been prepared.

You may also want to take the instrument into a dark room and, with the instrument ON, hold down the LIGHT key. The instrument back-light should illuminate the LCD so that the display can be easily read.

Calibration/Storage Chamber

The Model 55 has a convenient calibration/storage chamber built into the instrument's side. This chamber provides an ideal storage area for the probe during transport and extended non-use. If you look into the chamber, you should notice a small round sponge in the bottom. Carefully put 3 to 6 drops of clean water into the sponge. Turn the instrument over and allow any excess water to drain out of the chamber. The wet sponge creates a 100% water saturated air environment for the probe which is ideal for dissolved oxygen calibration.



HandStrap

The hand strap is designed to allow comfortable operation of the Model 55 with minimum effort. If the hand strap is adjusted correctly, it is unlikely that the instrument will be easily dropped or bumped from your hand.

To adjust the hand strap on the back of the meter, unsnap the leather cover and pull the two Velcro strips apart. Place your hand between the meter and the strap and adjust the strap length so that your hand is snugly held in place. Press the two Velcro strips back together and snap the leather cover back into place.

The Meter Case

The meter case is sealed at the factory and is not intended to be opened, except by authorized service technicians. **Do not attempt to separate the two halves of the meter case as this may damage the instrument, break the water-proof seal, and may void the manufacturer's warranty.**

PREPARING THE PROBE

Description

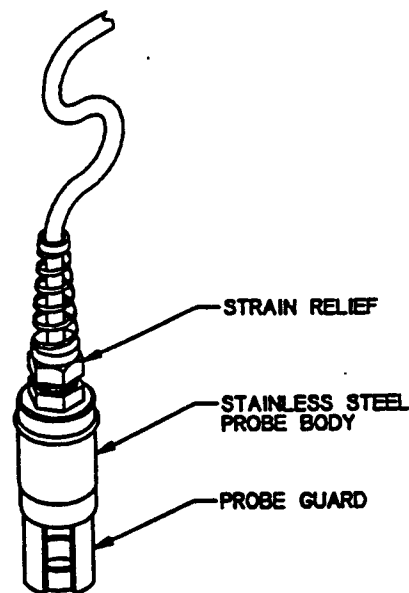
The YSI Model 55 dissolved oxygen probe is a non-detachable, polarographic sensor designed specifically for the YSI Model 55 Handheld Dissolved Oxygen System. Probe cables are available in lengths of 12, 25 or 50 feet.

Choosing The Right Membrane

The YSI Model 5775 Standard Membrane Kit is supplied with the YSI Model 55. This kit contains thirty 1 mil (.001") membranes and a bottle of KCl solution. YSI recommends the 5775 membranes for most applications.

For special conditions, a 0.5 mil (.0005") membrane is available. Order YSI Model 5776 High Sensitivity Membrane Kit. This half-thickness membrane improves measurement time at low temperatures and helps suppress background current at very low dissolved oxygen levels. When data is routinely collected at sample temperatures below 15°C and at dissolved oxygen levels below 20% air saturation, the low signal current resulting from the use of the standard membranes tends to magnify the probe's inherent constant background signal. Using the high sensitivity membranes in this situation will decrease the percentage of error due to the probe's background current.

For long-term monitoring situations **ONLY**, a half-sensitivity, double-thickness, 2 mil (.002~") membrane is available. For these applications, order the YSI Model 5685 Membrane Kit, which includes membranes and electrolyte.



Probe Preparation

The YSI Model 55 probe is shipped dry. **Before using the Model 55, the protective membrane on the probe tip must be removed, the probe must be filled with KCl solution and a new membrane must be installed. Follow the instructions below to install the KCl solution and a new membrane must be installed. Follow the instructions below to install the KCl solution and membrane.**

To prepare for installation of a new membrane on your YSI Model 55 dissolved oxygen probe:

1. Unscrew the probe sensor guard.
2. Remove the old O-ring and membrane.

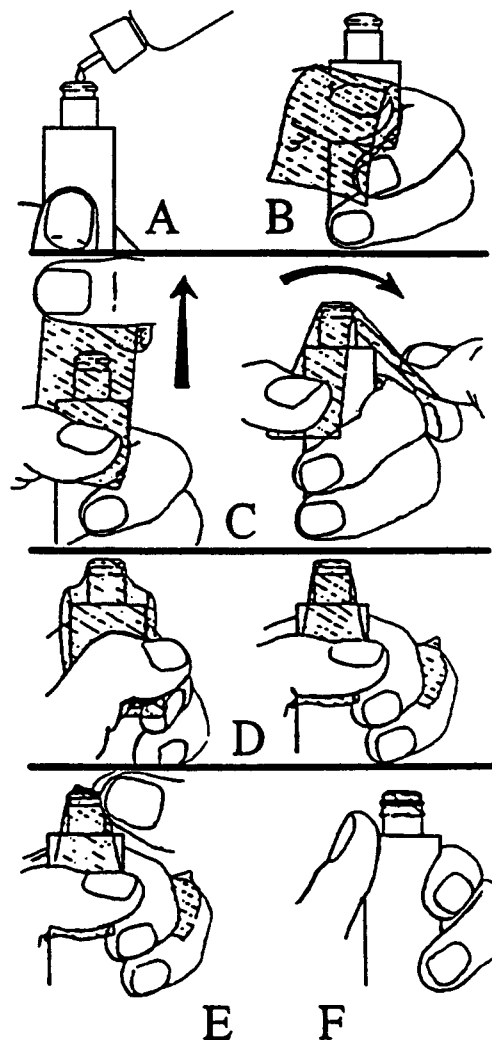
3. Thoroughly rinse the sensor tip and KCl reservoir with distilled water.
4. Prepare the electrolyte according to the directions on the KCl solution bottle.

Membrane Installation

- A. Secure a membrane between your thumb and the probe body.
Add electrolyte to the probe until a large meniscus completely covers the gold cathode.

NOTE: Handle the membrane material with care, touching it at the ends only.

- B. With the thumb and forefinger of your other hand, grasp the free end of the membrane.
- C. With a continuous motion, stretch the membrane up, over, and down the other side of the sensor. Stretching forms the membrane to the contour of the sensor tip.
- D. Secure the end of the membrane under your forefinger while continuing to hold the probe.
- E. Roll the O-ring over the end of the probe, being careful not to touch the membrane surface. There should be no wrinkles in the membrane or trapped air bubbles under the membrane. Some wrinkles may be removed by lightly tugging on the edges of the membrane beyond the O-ring.
- F. Trim off excess membrane with scissors or a sharp knife. Check that the stainless steel temperature sensor is not covered by excess membrane.
- G. Shake off excess KCl. Rinse the stainless steel thoroughly with distilled water to prevent corrosion. Reinstall the sensor guard. The sensor should be kept in a humid environment (such as the calibration chamber) between measurements and when not in use.



Probe Operation and Precautions

1. Membrane life depends on usage. Membranes will last a long time if installed properly and treated with care. Erratic readings are a result of loose, wrinkled, damaged, or fouled membranes, or from large (more than 1/8" diameter) bubbles in the electrolyte reservoir. If erratic readings or evidence of membrane damage occurs, you should replace the membrane and the KCl solution. The average replacement interval is two to four weeks.
2. If the membrane is coated with oxygen consuming (e.g. bacteria) or oxygen evolving organisms (e.g. algae), erroneous readings may occur.
3. Chlorine, sulfur dioxide, nitric oxide, and nitrous oxide can affect readings by behaving like oxygen at the probe. If you suspect erroneous readings, it may be necessary to determine if these gases are the cause.
4. Avoid any environment which contains substances that may attack the probe materials. Some of these substances are concentrated acids, caustics, and strong solvents. The probe materials that come in contact with the sample include FEP Teflon, acrylic plastic, EPR rubber, stainless steel, epoxy, polyetherimide and the polyurethane cable covering.
5. For correct probe operation, the gold cathode must always be bright. If it is tarnished (which can result from contact with certain gases), or plated with silver (which can result from extended use with a loose or wrinkled membrane), the gold surface must be restored. To restore the cathode, you may either return the instrument to the factory or clean it using the YSI Model 5680 Probe Reconditioning Kit. Never use chemicals or abrasives not supplied with this kit.
6. It is also possible for the silver anode to become contaminated, which will prevent successful calibration. To clean the anode, remove the O-ring and membrane and soak the probe overnight in 3 % ammonium hydroxide. Next, rinse the sensor tip and KCl reservoir with deionized water, add new KCl solution, and install a new membrane and O-ring. Turn the instrument on and allow the system to stabilize for at least 30 minutes. If, after several hours, you are still unable to calibrate, return the YSI Model 55 system to an authorized service center for service.
7. If the sensor O-ring is worn or loose, replace it with the appropriate O-ring provided in the YSI Model 5945 O-ring Pack.
8. To keep the electrolyte from drying out, store the probe in the calibration/storage chamber with the wet sponge.

Calibration

Dissolved oxygen calibration must be done in an environment with a known oxygen content. Since the amount of oxygen in the atmosphere is known, it makes an excellent environment for calibration (at 100% relative humidity). The calibration/storage chamber contains a moist sponge to create a 100% water saturated air environment.

Before You Calibrate

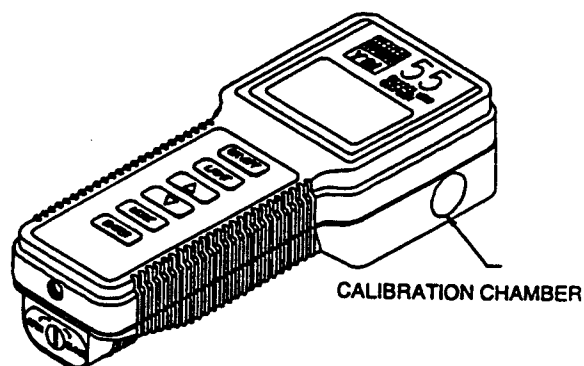
Before you calibrate the YSI Model 55, complete the procedures discussed in the *Preparing the Meter* and *Preparing the Probe* section of this SOP.

To accurately calibrate the YSI Model 55, you will need to know the following information:

- The approximate altitude of the region in which you are located.
- The approximate salinity of the water you will be analyzing. Fresh water has a salinity of approximately zero. Sea water has a salinity of approximately 35 parts per thousand (ppt). If you are not certain what the salinity of the sample water is, use a YSI Model 30 Salinity-Conductivity-Temperature meter to determine it.

The Calibration Process

1. Ensure that the sponge inside the instrument's calibration chamber is wet. Insert the probe into the calibration chamber.
2. Turn the instrument on by pressing the ON/OFF button on the front of the instrument. Wait for the dissolved oxygen and temperature readings to stabilize (usually 15 minutes is required after turning the instrument on).
3. To enter the calibration menu, use two fingers to press and release both the UP ARROW and DOWN ARROW keys at the same time.



4. The LCD will prompt you to enter the local altitude in hundreds of feet. Use the arrow keys to increase or decrease the altitude.

EXAMPLE: Entering the number 12 here indicates 1200 feet.

5. When the proper altitude appears on the LCD, press the ENTER key. The Model 55 should now display **CAL** in the lower left of the display, the calibration value should be displayed in the lower right of the display and the current DO reading (before calibration) should be on the main display.
6. Make sure that the DO reading (large display) is stable, then press the ENTER button. The LCD will prompt you to enter the approximate salinity of the water you are about to analyze. You can enter any number from 0 to 40 parts per thousand (PPT) of salinity. Use the arrow keys to increase or decrease the salinity setting. When the correct salinity appears on the LCD (zero for fresh water), press the ENTER key. The instrument will return to normal operation.

Once the calibration process is complete, the only keys which will remain operational are the **MODE** key, the **LIGHT** key and the **ON/OFF** key. You can move back and forth from reading dissolved oxygen in the mg/L mode or the % air saturation mode by pressing the **MODE** key. If you are working in a dark area and have difficulty reading the LCD, press and hold the **LIGHT** key to activate the back-light of the YSI Model 55. The **ON/OFF** key turns the instrument on or off.

For best results:

- Each time the Model 55 is turned off, re-calibrate before taking measurements.
- Calibrate at a temperature within $\pm 10^{\circ}\text{C}$ of the sample temperature.

Principles Of Operation

The sensor consists of an acrylic body with a circular gold cathode embedded in the end. Inside the gold ring there is a small chamber containing a porous silver anode. In operation, this chamber is filled with a solution of KCl electrolyte containing a small amount of surfactant to improve wetting action.

A thin permeable membrane, stretched over the sensor, isolates the electrodes from the environment, while allowing gases to enter. When a polarizing voltage is applied to the sensor electrodes, oxygen which has passed through the membrane reacts at the cathode causing a current to flow.

The membrane passes oxygen at a rate proportional to the pressure difference across it. Since oxygen is rapidly consumed at the cathode, it can be assumed that the oxygen pressure inside the membrane is zero. Hence, the force causing the oxygen to diffuse through the membrane is proportional to the partial pressure of oxygen outside the membrane. As the oxygen partial pressure varies, so does the oxygen diffusion through the membrane. This causes the probe current to change proportionally.

It is important to recognize that oxygen dissolved in the sample is consumed during the test. It is therefore essential that the sample be continuously stirred at the sensor tip. If stagnation occurs, your readings will be artificially low. Stirring may be accomplished by mechanically moving the sample around the probe tip, or by rapidly moving the probe through the sample. The rate of stirring should be at least 1 foot per second.

Discussion Of Measurement Errors

There are three basic types of dissolved oxygen errors. Type 1 errors are related to limitations of instrument design and tolerances of instrument components. These are primarily the meter linearity and the resistor tolerances. Type 2 errors are due to basic probe accuracy tolerances, mainly background signal, probe linearity, and variations in membrane temperature coefficient. Type 3 errors are related to the operator's ability to determine the conditions at the time of calibration. If calibration is performed against more accurately known conditions, type 3 errors are appropriately reduced.

Type 1 Errors

- A. Meter linearity error: $\pm 1\%$ of full scale reading, or ± 0.15 mg/L
- B. Component and circuitry error: ± 0.05 mg/L

Type 2 Errors

- A. DO errors caused by temperature compensation for measurements at $\pm 10^{\circ}\text{C}$ from calibration temperature: $\pm 1\%$ (0.08 mg/L at 25°C)
- B. DO errors caused by temperature measurement errors: A maximum $\pm 0.2^{\circ}\text{C}$ temperature error is equal to $\pm 0.5\%$ (0.04 mg/L at 25°C).

Type 3 Errors

A. Altitude:

Operator Error: A 1000 foot error in altitude (when calibrating) is equal to an error of approximately 3.6% at the 10 mg/L level.

Instrument Error: The maximum DO error caused by calibrating to altitude in increments of 100 feet: $\pm 0.18\%$ ($< 0.015\text{mg/L}$ at 25°C)

B. Humidity:

Errors occur if calibration is performed at less than 100% humidity. The worst possible case would be calibration at 0% humidity. The error varies with the calibration temperature as follows:

Temperature	Calibration Error at 0% humidity
0°C	0.09 mg/L
10°C	0.14 mg/L
20°C	0.21 mg/L
30°C	0.33 mg/L
40°C	0.50 mg/L

Approximating The Error

It is unlikely that the actual error in any measurement will be the maximum possible error. A better error approximation is obtained using a root mean squared (r.m.s.) calculation:

$$\text{r.m.s. error} = \pm [1a^2 + 1b^2 + 2a^2 + 2b^2 + 3a^2 + 3b^2]^{\frac{1}{2}} \text{ mg/L}$$

NOTE: This sample calculation is for a near extreme set of conditions.

Troubleshooting

SYMPTOM	POSSIBLE CAUSE	ACTION
1. Instrument will not turn on	A. Low battery voltage B. Batteries installed wrong C. Meter requires service	A. Replace batteries (Page 3) B. Check battery polarity. (Page 3) C. Return system for service (Page 14)
2. Instrument will not calibrate	A. Membrane is fouled or damaged B. Probe anode is fouled or dark C. Probe cathode is tarnished D. System requires service	A. Replace membrane and KCl (Page 6) B. Clean anode (Page 7) C. Clean cathode (Page 7) D. Return system for service (Page 14)
3. Instrument "locks up"	A. Instrument has rec'd a shock B. Batteries are low or damaged C. System requires service	A. Remove battery lid, wait 15 seconds for reset, replace lid. (Page 3) B. Replace batteries (Page 3) C. Return system for service (Page 14)
4. Instrument readings are inaccurate	A. Cal altitude is incorrect B. Salinity setting is incorrect C. Probe not in 100% water saturated air during Cal procedure D. Membrane fouled or damaged E. Probe anode is fouled or dark F. Probe cathode is tarnished G. System requires service	A. Recalibrate w/correct value (Page 8) B. Recalibrate w/correct value (Page 8) C. Moisten sponge and place in Cal chamber w/ probe and Recal (Page 4,8) D. Replace membrane (Page 6) E. Clean anode (Page 7) F. Clean cathode (Page 7) G. Return system for service (Page 14)
5. LCD displays "LO BAT"	A. Batteries are low or damaged	A. Replace batteries (Page 3)
6. LCD displays message "ER 0"	A. Instrument's self-test detects improper probe voltage during calibration.	A. Return system for service (Page 14)
7. LCD displays message "ER 1"	A. Instrument's self-test detects a variance in RAM B. System requires service	A. Remove battery lid, wait 15 seconds for reset, replace lid. (Page 3) B. Return system for service (Page 14)
8. LCD displays message "ER 2"	A. Instrument's self-test detects a variance in ROM checksum B. System requires service	A. Remove battery lid, wait 15 seconds for reset, replace lid. (Page 3) B. Return system for service (Page 14)

SYMPTOM	POSSIBLE CAUSE	ACTION
9. LCD displays message "ER 3"	A. Instrument's self-test detects a system malfunction or component failure B. System requires service	A. Remove battery lid, wait 15 seconds for reset, replace lid. (Page 3) B. Return system for service (Page 14)
10. LCD displays message "ER 4"	A. Sample O ₂ concentration is more than 20 mg/L. B. System requires service	A. Recalibrate using correct altitude and salinity compensation (Page 8). B. Return system for service (Page 14)
11. LCD displays message "ER 5"	A. Sample O ₂ concentration is below - 0.5 mg/L. B. System requires service	A. Recalibrate using correct altitude and salinity compensation (Page 8). B. Return system for service (Page 14)
12. LCD displays message "ER 6"	A. Sample saturation is more than 200%. B. System requires service	A. Recalibrate using correct altitude and salinity compensation (Page 8). B. Return system for service (Page 14)
13. LCD displays message "ER 7"	A. Sample saturation is less than -3.0%. B. System requires service	A. Recalibrate using correct altitude and salinity compensation (Page 8). B. Return system for service (Page 14)
14. LCD displays message "ER 8"	A. Sample temperature is more than +45.9°C. B. System requires service	A. Reduce the sample temperature B. Return system for service (Page 14)
15. LCD displays message "ER 9"	A. Sample temperature is less than -5°C. B. System requires service	A. Increase sample temperature. B. Return system for service (Page 14)

Cleaning Instructions

NOTE: Before they can be serviced, equipment exposed to biological, radioactive, or toxic materials must be cleaned and disinfected. Biological contamination is presumed for any instrument, probe, or other device that has been used with body fluids or tissues, or with waste water. Radioactive contamination is presumed for any instrument, probe or other device that has been used near any radioactive source.

If an instrument, probe, or other part is returned or presented for service without a Cleaning Certificate, and if in our opinion it represents biological or radioactive hazard, our service personnel reserve the right to withhold service until appropriate cleaning, decontamination, and certification has been completed. We will contact the sender for instructions as to the disposition of the equipment. Disposition costs will be the responsibility of the sender.

When service is required, either at the user's facility or at YSI, the following steps must be taken to insure the safety of our service personnel.

1. In a manner appropriate to each device, decontaminate all exposed surfaces, including any containers. 70% isopropyl alcohol or a solution of ¼ cup bleach to 1 gallon tap water are suitable for most disinfecting. Instruments used with waste water may be disinfected with .5% Lysol if this is more convenient to the user.
2. The user shall take normal precautions to prevent radioactive contamination and must use appropriate decontamination procedures should exposure occur.
3. If exposure has occurred, the customer must certify that decontamination has been accomplished and that no radioactivity is detectable by survey equipment.
4. Any product being returned to the YSI Repair Center, should be packed securely to prevent damage.
5. Cleaning must be completed and certified on any product before returning it to YSI.

References

1. YSI Model 55 Operations Manual
2. EPA Methods for Chemical Analysis of Water and Wastes, Method 360.1 (Membrane Electrode)
3. Standard Methods for Examination of Water and Wastewater. Oxygen (Dissolved) 421 F. Membrane Electrode Method. 15th ed. 1980

Appendix A - Solubility Table

Solubility of Oxygen in mg/L in Water Exposed to Water-Saturated Air at 760 mm Hg Pressure.

Salinity = Measure of quantity of dissolved salts in water.

Chlorinity = Measure of chloride content, by mass, of water.

$$S(‰) = 1.80655 \times \text{Chlorinity } (‰)$$

Temp °C	Chlorinity: 0 Salinity: 0	5.0 ppt 9.0 ppt	10.0 ppt 18.1 ppt	15.0 ppt 27.1 ppt	20.0 ppt 36.1 ppt	25.0 ppt 45.2 ppt
0.0	14.62	13.73	12.89	12.10	11.36	10.66
1.0	14.22	13.36	12.55	11.78	11.07	10.39
2.0	13.83	13.00	12.22	11.48	10.79	10.14
3.0	13.46	12.66	11.91	11.20	10.53	9.90
4.0	13.11	12.34	11.61	10.92	10.27	9.66
5.0	12.77	12.02	11.32	10.66	10.03	9.44
6.0	12.45	11.73	11.05	10.40	9.80	9.23
7.0	12.14	11.44	10.78	10.16	9.58	9.02
8.0	11.84	11.17	10.53	9.93	9.36	8.83
9.0	11.56	10.91	10.29	9.71	9.16	8.64
10.0	11.29	10.66	10.06	9.49	8.96	8.45
11.0	11.03	10.42	9.84	9.29	8.77	8.28
12.0	10.78	10.18	9.62	9.09	8.59	8.11
13.0	10.54	9.96	9.42	8.90	8.41	7.95
14.0	10.31	9.75	9.22	8.72	8.24	7.79
15.0	10.08	9.54	9.03	8.54	8.08	7.64
16.0	9.87	9.34	8.84	8.37	7.92	7.50
17.0	9.67	9.15	8.67	8.21	7.77	7.36
18.0	9.47	8.97	8.50	8.05	7.62	7.22
19.0	9.28	8.79	8.33	7.90	7.48	7.09

Temp °C	Chlorinity: 0 Salinity: 0	5.0 ppt 9.0 ppt	10.0 ppt 18.1 ppt	15.0 ppt 27.1 ppt	20.0 ppt 36.1 ppt	25.0 ppt 45.2 ppt
20.0	9.09	8.62	8.17	7.75	7.35	6.96
21.0	8.92	8.46	8.02	7.61	7.21	6.84
22.0	8.74	8.30	7.87	7.47	7.09	6.72
23.0	8.58	8.14	7.73	7.34	6.96	6.61
24.0	8.42	7.99	7.59	7.21	6.84	6.50
25.0	8.26	7.85	7.46	7.08	6.72	6.39
26.0	8.11	7.71	7.33	6.96	6.62	6.28
27.0	7.97	7.58	7.20	6.85	6.51	6.18
28.0	7.83	7.44	7.08	6.73	6.40	6.09
29.0	7.69	7.32	6.96	6.62	6.30	5.99
30.0	7.56	7.19	6.85	6.51	6.20	5.90
31.0	7.43	7.07	6.73	6.41	6.10	5.81
32.0	7.31	6.96	6.62	6.31	6.01	5.72
33.0	7.18	6.84	6.52	6.21	5.91	5.63
34.0	7.07	6.73	6.42	6.11	5.82	5.55
35.0	6.95	6.62	6.31	6.02	5.73	5.46
36.0	6.84	6.52	6.22	5.93	5.65	5.38
37.0	6.73	6.42	6.12	5.84	5.56	5.31
38.0	6.62	6.32	6.03	5.75	5.48	5.23
39.0	6.52	6.22	5.98	5.66	5.40	5.15
40.0	6.41	6.12	5.84	5.58	5.32	5.08
41.0	6.31	6.03	5.75	5.49	5.24	5.01
42.0	6.21	5.93	5.67	5.41	5.17	4.93
43.0	6.12	5.84	5.58	5.33	5.09	4.86
44.0	6.02	5.75	5.50	5.25	5.02	4.79
45.0	5.93	5.67	5.41	5.17	4.94	4.72

* This table is provided for your information only. It is **NOT** required when calibrating the Model 55 in accordance with the instructions outlined in the chapter entitled *Calibration*.

Appendix B - Conversion Chart

To Convert From	To	Equation
Feet	Meters	Multiply by 0.3048
Meters	Feet	Multiply by 3.2808399
Degrees Celsius	Degrees Fahrenheit	$(^{\circ}\text{C} \times 9/5) + 32$
Degrees Fahrenheit	Degrees Celsius	$(^{\circ}\text{F} - 32) \times 5/9$
Milligrams per liter (mg/L)	Parts per million (ppm)	Multiply by 1



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Fluid Level Measurements in Monitoring Wells

Environmental Decision Group, Inc. SOP Number - 7 (A)

Revision Number - 2

Date - January 13, 1999

THEORY

This Standard Operating Procedure (SOP) describes the method for measuring the fluid level in a monitoring well. Fluid level measurements may consist of three types: 1) measurement of the depth to groundwater; 2) measurement of the volume of water standing in a monitoring well; and 3) measurement of the thickness of an immiscible layer on the groundwater. The depth to water (DTW) is needed to determine the horizontal and vertical groundwater flow gradients for an aquifer. The standing volume of water is necessary to calculate the purge volume prior to monitor well sampling. Finally, fluid level measurements may also involve determining the thickness of immiscible layers in the well, both as light, non-aqueous phase liquids (LNAPLs) and dense, non-aqueous phase liquids (DNAPLs).

SUMMARY

Fluid level measurements are made by lowering an electric probe attached to a measuring tape down the well until the device indicates that an interface media (e.g. air/water, air/oil, oil/water) has been encountered. The measurement is made from a reference point marked on the well casing. The elevation of the reference point is established by a licensed surveyor, accurate within 0.01 foot. The measurement should be recorded in a field note book and/or field data sheet immediately. If possible, two independent measurements should be made to ensure that the tape is being read accurately.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ ground cloth
- ___ water level indicator or interface probe
- ___ organic vapors monitor (OVM)
- ___ PPE dictated by site health and safety plan
- ___ decontamination equipment (See EDG SOP 9 and 10)
- ___ field logbook or sample data sheets

PROCEDURES

1. Place ground cloth next to well and stage all equipment on the cloth.
2. Remove the locking and protective covers.
3. Sample the air in the well head for organic vapors using the OVM.



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4. Rinse the probe with a deionized or distilled water spray and wipe with a clean paper towel.
5. Lower the probe slowly down the well, wiping the tape with a damp paper towel as it is lowered.
6. When the device indicates that the interface has been reached (usually by a tone or light) obtain the depth measurement by aligning the tape with the surveyed reference point.
7. Record the measurement.
8. Obtain and record a second independent measurement within 0.01 ft. of the first measurement.
9. Rewind the probe from the well while wiping the tape with a damp paper towel.
10. Decontaminate the probe with a deionized or distilled water spray and paper towels or with an Alconox solution, if necessary.

WARNING:

DO NOT use solvents to clean a heavily oiled probe. Soak the unit in trisodium phosphate or Alconox overnight, if necessary.

REFERENCE

EPA, 1985, Practical Guide for Groundwater Sampling, EPA/600/2-85/104

EPA, 1986, RCRA Ground Water Monitoring Technical Enforcement Guidance Document

USEPA/NWWA, 1989, Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA 600/4089/034

USEPA. 1991. Compendium of ERT Groundwater Sampling Procedures. OSWER Directive 9360.4-06.

Monitoring Well Purging Using Bailers

Environmental Decision Group, Inc. SOP Number - 7B
Revision Number - 2
Date - January 13, 1999

LIMITATION

Considerable discussion exists on the best technique for purging monitoring wells. Some researchers have indicated that, under certain conditions, purging may not be required. Other researchers have indicated that multiple well volumes (> 5) of well bore waters should be removed prior to obtaining any samples considered representative of the aquifer. This Standard Operating Procedure (SOP) describes EDG's methods for purging monitoring wells, and should apply to most sites. Alternative techniques are possible, and EDG Project Manager should consult an EDG Hydrogeologist or Geochemist when warranted.

THEORY

When obtaining a groundwater sample it is critical that the sample is representative of the water in the formation being sampled. Water that has remained in the well casing for extended periods of time has had the opportunity to exchange gases with the atmosphere and react with well casing materials. This stagnant water is not representative of that in the aquifer and must be removed prior to sampling.

Purging is considered complete when the pH, electrical conductivity, and temperature have stabilized. The definition of "stabilized" may depend upon site conditions and instrumentation. For example, consecutive measurements within 10% of each other may indicate stabilization. Measurements are repeated for each well volume of water removed until the parameters have stabilized. If a well is bailed dry before three casing volumes are removed, the well is sampled when the volume of water in the well is sufficient.

SUMMARY

Prior to purging, all equipment is decontaminated and staged at the wellhead on a clean ground cloth. The water level is then measured according to EDG SOP 7A. The volume of water in the casing is calculated by multiplying the height of the water column in the well by an appropriate conversion factor.

The bailer is secured to an appropriate length of nylon rope or string and is lowered into the well. When the bailer is full of fluid, it is carefully retrieved so that the length of string does not drop on unprotected ground and contaminate it. The bailer is then emptied of fluid into a calibrated bucket until one casing volume is removed, or the well is dry. After each volume of bore water is removed, the pH, conductivity, and temperature are measured and recorded in a field notebook and/or data sheet. Additional water is removed and the parameters are re-measured until they stabilize within specified limitations. After the parameters have stabilized, the well may be sampled.



EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ sampling plan
- ___ PPE dictated by site health and safety plan
- ___ maps
- ___ field logbooks
- ___ data forms
- ___ indelible ink pen
- ___ pH, conductivity, and temperature meters (see EDG SOPs 5A, 5B, and 5C)
- ___ clean beakers or containers (see EDG SOP 7C)
- ___ bailer
- ___ nylon string
- ___ drop cloths, plastic sheeting, or Visqueen (or equivalent)
- ___ decontamination supplies (see EDG SOP 9 and 10)

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling point.
4. Place sampling gear on the sheeting.
5. Decontaminate gear (see EDG SOP 9 or 10).
6. Measure the depth to water (DTW) and total depth, if necessary according to EDG SOP 7A.
7. Calculate the casing volume; Calculate three casing volumes.
8. Secure the bailer to the nylon string. Be sure the string is knotted tightly to avoid loss of the bailer in the well.
9. Slowly lower the bailer into the monitoring well. All actions should be completed slowly to avoid turbidity. Avoid allowing the bailer to rest at the bottom of the well, as fine sediments may be trapped and impede the ball valve.
10. Allow the bailer to fill with fluid.
11. Carefully raise the bailer such that the string is oriented over the plastic sheeting and does not become tangled. Do not allow the string to drop to the unprotected ground and contaminate it.



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12. Examine the bailer for evidence of a floating light, non-aqueous phase liquids (LNAPLs) or an oil sheen. If present, do not sample the well.
13. Examine the bailer for evidence of a dense, non-aqueous phase liquids (DNAPLs).
14. Empty the bailer into the calibrated bucket.
15. Continue bailing until one casing volume is extracted or the monitoring well is dry.
16. If the well is bailed dry, allow to recover and sample.
17. After each volume is removed, obtain a sample in the beaker to measure pH, conductivity, and temperature (see EDG SOPs 5A, 5B, and 5C).
18. Remove the additional well volume and repeat the measurements until the parameters have stabilized. The stabilization criteria are:

pH: " 0.02 pH units
Specific conductance: " 10 %
Temperature: " 0.1 °C
19. Drum all purge water, if appropriate.
20. Sample the monitoring well (see EDG SOPs 7B, 7C, and 7D).

REFERENCE

EPA, 1985, Practical Guide for Groundwater Sampling, EPA/600/2-85/104

EPA, 1986, RCRA Ground Water Monitoring Technical Enforcement Guidance Document

EPA/NWWA, 1989, Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA 600/4089/034

EPA, 1991, Compendium of ERT Groundwater Sampling Procedures, OSWER Directive 9360.4-06

Driscoll, 1986. Groundwater and Wells (The Johnson Manual)

EDG, INC. SAMPLING AND WELL STABILIZATION FORM

[illegible]

At Least ___ Well Bore Volumes Were Evacuated Before Sampling

$$\text{Discharge Rate} = \text{GPM} \times 0.00223 = \text{cfs}$$

Comments:

[Comments may continue on back]

Form Completed By:

Witnessed By:



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Groundwater Sampling Using Bailers

Environmental Decision Group, Inc. SOP Number - 7 (C)

Revision Number - 2

Date - January 13, 1999

THEORY

It is important for groundwater samples to be representative of groundwater conditions *in situ*. This Standard Operating Procedure (SOP) describes methods for sampling groundwater from a well with a bailer. The SOP will not address the sampling of nonaqueous phase liquids (NAPL) as floaters (LNAPLs) or sinkers (DNAPLs) in groundwater.

SUMMARY

A groundwater water sample is collected from a monitoring well by slowly lowering a clean ball check bailer into the well water. Once full, the bailer is lifted from the well and the water is poured into the necessary sample containers. Some of the equipment required to purge and measure the well water parameters (e.g. pH and conductivity meters, filters, etc.) will also be a part of the well sampler's inventory. Proper usage of these items is discussed in other EDG SOPs.

Aeration should be minimized when collecting the water in the bailer and when pouring the water into the containers. Sample bottles may contain preservative depending on the expected holding times. The samples should be stored in a chilled environment (about 4°C) while on the job site and during shipment to the lab.

There are several different classes of bailers that may be selected for a job. The choice of a bailer depends on the contaminants expected and the acceptable level of Quality Assurance (QA) for the analytical results. Guidelines for selection of the proper bailer are provided in this SOP.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ sampling plan
- ___ maps
- ___ field logbooks
- ___ data forms
- ___ PPE dictated by site health and safety plan
- ___ sample containers
- ___ sample labels
- ___ sample chain of custody seals, if necessary
- ___ chain of custody forms
- ___ cooler(s) or carry - boxes
- ___ wet ice or blue ice, if necessary
- ___ decontamination supplies (see EDG SOP 9 and 10)
- ___ drop cloths, plastic sheeting, or Visqueen (or equivalent)



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- ___ paper towels
- ___ indelible ink pen
- ___ bailers
- ___ nylon rope or string
- ___ distilled water
- ___ pH, conductivity, and temperature meters (see EDG SOPs 5A, 5B, and 5C)
- ___ drop cloths, plastic sheeting, or Visqueen (or equivalent)
- ___ decontamination supplies (see EDG SOP 9 and 10)

BAILER SELECTION

Typically, the same bailer that is used to purge the well before sampling may be used to extract a sample. This bailer may be:

- 1) disposable - used only for a single well purge and sample event and then disposed;
- 2) dedicated - used only at a single well to purge and collect numerous samples; or
- 3) transferable - used for purging and collecting samples from several different wells.

Bailers can be ranked for the appropriate use based on the project needs, goals, and the contaminants present. Below are guidelines that describe the various types of bailers, QA needs, advantages, and disadvantages of each.

Teflon

Recommended uses and advantages:

- Highest QA; suitable where high detail/high sensitivity required with the lowest possible error due to sampling bias.
- Where free-phase solvents are present or in water with high concentrations of dissolved solvents.
- Hydrocarbons will not adsorb on surface of bailer, thus will not contribute to bias in analytical results.

Disadvantages:

- Relatively expensive
- Unnecessary for QA on normal detailed projects.

Stainless Steel

Recommended uses and advantages:



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- Similar QA as teflon for most substances.
- Easily cleaned for reuse in other wells, if required.
- Heavy, will sink quickly in high density, saline water.

Disadvantages:

- Expensive
- May give interference for certain metals.
- May corrode after repeated use in saline water.

PVC - disposable

Recommended use and advantages:

- Bailer of choice for sampling on most normal detail projects. Appropriate for sampling petroleum-fuel contaminated sites and collecting water with low quantities of solvents.
- Disposing of bailer after single use means that water will not be recontaminated by release at a later sample event of adsorbed hydrocarbons on bailer PVC material.
- Inexpensive unit cost.

Disadvantages:

- Not to be used where there are high concentrations of aggressive solvents.
- The tendency for PVC to adsorb hydrocarbons may influence (lower) results where high detail/high QA is required.

PVC - dedicated

Recommended use and advantages:

- Similar to the PVC - disposable bailer but usually constructed of a slightly heavier gauged PVC. Similar QA certainties.
- Inexpensive unit cost - the bailer is cheap and the cost of buying bailers for every sample event is avoided.

Disadvantages:

- Similar to PVC - disposable, but repeated use will increase chances of release of tiny quantities



of hydrocarbons from the PVC material back into the water.

PVC - transferable

Recommended use and advantages:

- Reconnaissance data.
- Bailer can be easily transported as a single piece of equipment.
- One-time unit cost for numerous sample events on numerous wells.

Disadvantages:

- Increased sample time and man-hour cost because bailer must be thoroughly cleaned after each use.
- Difficult to thoroughly clean bailer; increased chance of transferring contamination from well to well. The adsorbed hydrocarbons are almost impossible to remove entirely after repeated use in petroleum-contaminated water.

PROCEDURES

The water sample is collected after the well has been properly purged (see EDG SOP 7B). The data collected prior to sampling will be the depth to water and water characteristic parameters such as pH, TDS, and temperature. Before a sample is taken the data should show that these water parameters have stabilized. The well head location will have been prepared for the sampling event during purging.

1. Review sampling plan and health and safety plan.
2. Assemble sampling gear inventory.
3. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling point.
4. Place sampling gear on the sheeting.
5. Decontaminate gear (see EDG SOP 9 or 10).
6. Assemble required laboratory sample jars, bottles, vials.
7. Mark labels with indelible ink. The most generic label should include the sample number and confirmation of a preservative. See EDG SOPs 1A or 1B.
8. Attach labels to dry containers.



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9. If necessary, prepare containers requiring preservative by adding the needed amount as per laboratory instructions. Care should be taken to avoid spilling acid or base preservative on skin or clothes.
10. Prepare filtration method, if required (see EDG SOP 7D).
11. Prepare bailer: If disposable, remove bailer from plastic bag and attach nylon rope or string. If dedicated, detach old string and replace with new. Ensure that ball valve has free movement and is functional.
12. Slowly lower the bailer into the monitoring well. All actions should be completed slowly to avoid turbidity. Do not allow the bailer to rest at the bottom of the well, as fine sediments may be trapped and impede the ball valve.
13. Allow the bailer to fill with fluid.
14. Carefully raise the bailer such that the string is oriented over the plastic sheeting and does not become tangled. Do not allow the string to drop to the unprotected ground and become contaminated. While lifting, listen for water running out of the bailer due to an improper seal on the ball valve. If a leak is present, lower the bailer back into the water and try removing it again with a properly seated ball valve.
15. If volatile organic compounds (VOCs) are the target analytes, slowly pour water from the bottom of the bailer into the sample containers using the pour tube.
 - a. If 40 ml VOA vials are used, collect water in these first. Carefully pour water in the vial until a prominent meniscus forms at the rim. Do not overfill the vial; this will cause a loss of preservative.
 - b. Check the vial for bubbles adhering to the sides. If present, tap the side of the vial slightly with finger.
 - c. Place the teflon-lined cap over the mouth of the vial and tightly screw it into place.
 - d. Perform a final check for bubbles by tapping it firmly against a soft object, such as an arm. Hold the vial upside-down to check for bubbles that may have been jarred loose. If air bubbles are present, the vial must be opened and refilled as explained in the steps above.

NOTE: Do not use a preservative when sampling water containing dissolved carbonate or other reactive compounds. Gas will be generated by the mixture of water and acid.

16. If VOCs are not the target analytes, slowly pour water from the top of the bailer into the sample containers. Splashing or spillage should be minimized. Use EDG SOP 7D if filtering the sample is necessary.



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17. Complete the chain of custody form, indicating what analyses are necessary for each sample. See EDG SOP 1 for chain of custody requirements.
18. Complete the field logbooks and the field forms, as required in the sampling plan.
19. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to EDG SOP 1 for DOT and Federal Express requirements.
20. Remove all sampling refuse from the sampling site.

NOTE: For organics and other analytes with 7 to 14 day holding times, it is advisable to ship the water samples in sealed, iced coolers to the lab every 2 to 3 days. Check if the shipper allows wet ice in the containers during shipment.

REFERENCE

- NWWA/USEPA. 1986. RCRA Ground Water Monitoring Technical Enforcement Guidance Document. TEGD. USEPA-NWWA, Dublin, OH.
- USEPA. 1991. Compendium of ERT Groundwater Sampling Procedures. OSWER Directive 9360.4-06. USDOC-NTIS, Springfield, VA.
- USEPA. 1985. Practical Guide for Groundwater Sampling. EPA/600/2-85/104. USDOC-NTIS, Springfield, VA.

Groundwater Sample Collection - Filtering

Environmental Decision Group, Inc. SOP Number - 7 (D)
Revision Number - 1 - 1
Date - April 17, 1998

LIMITATION

Use of field filtration techniques is best performed after considering project objectives and groundwater geochemistry. Do not filter water for volatile organic analyses without consulting with a EDG Geochemist or Data Validator prior to use of field filtering equipment.

THEORY

Monitoring well construction can damage its host formation. This damage can lead to the introduction of suspended particulates into the well casing. These particulates, if incorporated into a groundwater sample sent for laboratory analysis, can bias resulting data high. This bias results from the attraction of many environmental hydrophobic pollutants to these suspended particulates. Alternatively, suspended particulates can directly elevate concentrations of measured metals due to the introduction of naturally occurring metals into the sample. Filtration allows removal of these particulates and results in unbiased analytical data that is more representative of groundwater chemistry *in situ*.

SUMMARY

This Standard Operating Procedure (SOP) describes the methods for filtering groundwater samples. Once a determination has been made to field filter groundwater samples, the constituents of concern and filtering equipment may be selected as follows:

- **semivolatile target analytes** - stainless steel filter with dedicated teflon tubing
- **metals analyses** - acrylic filter housing with reusable tubing
- **removal of suspended particulates/colloids analysis** - filter with 0.45 micron mesh size
- **removal of colloids** - series of filters with 0.1 or 0.05 micron mesh size

Several types of hardware are available for use. These include:

- syringe injectors
- hand operated pumps and vessels
- peristaltic pump with a tabletop filter housing
- in-line filters for use with well pumps

A syringe injector produces small quantities of filtrate, whereas a peristaltic pump rapidly produces large quantities of filtrate. In-line filters are designed for use with in-place well pumps.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- collected groundwater sample, approximately twice the volume required for analysis
(see EDG SOPs 7A through 7C)
- 1.0 micron membrane filter (for selected state [CA or FL] regulatory considerations),
or
- 0.45 micron membrane filter (for USEPA regulatory considerations), or
- 0.10 or 0.05 micron membrane filter (for dissolved aqueous geochemistry)
- sample pump or bailer
- sample containers
- acrylic or stainless steel filter housing
- teflon tubing, dedicated, if appropriate
- reusable plastic tubing, if appropriate
- peristaltic pump, if appropriate
- manufacturer's directions for use of the filtering apparatus
- sampling plan
- field logbooks / data forms
- PPE dictated by site health and safety plan
- decontamination supplies (see EDG SOP 9 and 10)
- drop cloths, plastic sheeting, or Visqueen (or equivalent)
- paper towels
- indelible ink pen

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Decontaminate filtering equipment (see EDG SOP 9 or 10).
3. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling point.
4. Place filtering equipment on the sheeting.
5. Complete well evacuation and sampling procedures (see EDG SOPs 7A through 7C).
6. Proceed with sampling collection as described in sampling plan.
7. Collect the groundwater for filtration in a clean container, such as a bucket or large teflon bottle. Obtain approximately twice the volume required for analysis. **DO NOT PRESERVE THE GROUNDWATER PRIOR TO FILTRATION.**
8. Assemble the filtering equipment according to the manufacturer's specifications. Connect the filtering equipment to a power source, such as a car battery, if necessary.

9. Pump the collected groundwater from its original container through the filter. Discard the first 50 % of the sample. Collect the remaining filtered water in a clean sample container, where the final volume is sufficient for the laboratory's needs. It is best if the sample is filtered as soon as possible after collection.
10. Add the appropriate preservative to the filtered sample, if necessary.
11. Place the lid on the sample container and tighten. Attach label to container.
12. Complete the field logbooks and the field forms, as required in the sampling plan.
13. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to EDG SOP 1A and 1B for DOT and Federal Express requirements.
14. Remove all sampling refuse from the sampling site.

REFERENCE

- Backhus, D. A., et al., 1993, Sampling Colloids and Colloid - Associated Contaminants in Ground Water, Groundwater 31, p. 466 - 479.
- EPA, 1985, Practical Guide for Groundwater Sampling, EPA/600/2-85/104
- EPA, 1986, RCRA Ground Water Monitoring Technical Enforcement Guidance Document
- EPA, 1990, Colloidal - Facilitated Transport of Inorganic Contaminants in Ground Water: Part I. Sampling Considerations, EPA/600/M-90/023

Decontamination for High Concentration Materials

Environmental Decision Group, Inc. SOP Number - 9
Revision Number - 1
Date - January 13, 1999

WARNING

This SOP is intended for decontamination of sampling gear and supplies used at work sites impacted with chemicals in high concentration. It may be preferable to dedicate gear to the project, rather than follow this extensive decontamination procedure.

This SOP will not replace project specific judgment when selecting decontamination media for chemicals in high concentrations. Consultation with corporate Health and Safety personnel, chemists, and even local medical emergency personnel should be performed prior to any commitment to a decontamination media. In addition, proper consideration for personal health and safety should be taken when decontaminating gear impacted with high concentration materials.

THEORY

Prevention or reduction of cross-contamination from high concentration chemical materials (such as neat, or pure, 1,1,1-trichloroethane; creosote sludge; waste petroleum; or spent cyanide salts) is a critical function at any work site involving these materials. Any chemical, when in high concentrations (such as > 1 % cyanide salts), may have correspondingly high potential impacts to human health. Similarly, chemicals present on a work-site in high concentrations (such as soils saturated with creosote at 5 %) can readily cross-contaminate otherwise clean environmental samples. Sample cross-contamination can lead to erroneous observations of the extent of chemical impacts.

SUMMARY

Most chemicals can be readily removed from non-porous surfaces, by selecting the decontamination media or method appropriate for the contaminant type. For example, organic tars may be removed if they are miscible with No. 2 diesel fuel. Dioxin contaminated ashes can be easily removed by a water-based mild soap solution. The selection of decontamination media for projects involving high concentration materials should be made only after consultation with a health and safety professional, chemist, and (if necessary) appropriate regulatory agencies.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

— Work Plan/Sampling Plan

- maps
- field logbooks
- data forms
- PPE dictated by site health and safety plan
- camera and film, if necessary
- decontamination media (see suggested media, Table 1 below, select more than one if appropriate)

Table 1

Option Selection	Contaminant of concern	Decontamination reagent or technique
<input type="checkbox"/>	Dust or oil saturated soil	A strong aqueous soap solution using quaternary ammonium sulfate or trisodium phosphate, or equivalent
<input type="checkbox"/>	Heavy metals	10 % nitric acid in aqueous solution*
<input type="checkbox"/>	Organic sludges API separator sludge Bunker C Coal tars	Diesel Hexane; pesticide grade* Methanol; pesticide grade*
<input type="checkbox"/>	Creosotes Phenols Cresylic acid Pentachlorophenol	Sodium bicarbonate and a strong aqueous soap solution using quaternary ammonium sulfate or trisodium phosphate, or equivalent
<input type="checkbox"/>	Cyanide salts	Basic (pH > 10) aqueous solution with trisodium phosphate and sodium hypochlorite
<input type="checkbox"/>	Polychlorinated biphenyls	Hexane* Methanol* A strong aqueous soap solution using quaternary ammonium sulfate or trisodium phosphate, or equivalent
<input type="checkbox"/>	Dehydrated residues	High pressure steam or water wash
<input type="checkbox"/>	General	A strong aqueous soap solution using quaternary ammonium sulfate or trisodium phosphate, or equivalent

* These reagents may invoke RCRA waste disposal regulations.

- drop cloths, plastic sheeting, or Visqueen (or equivalent)
- paper towels
- scrub brushes, if necessary
- clean spritzer bottles
- pans or tubs to collect washes and rinsates
- drums for storage of washes and rinsates (see EDG SOP 17)

- ___ swipe sample kits, if necessary
- ___ blank reagent test waters, if necessary
- ___ trash drum
- ___ wash tubs or buckets, if necessary
- ___ potable tap water, either from a water supply spigot or on-site storage tank
- ___ trash bags
- ___ pH or starch iodide paper, if necessary

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Prepare a wash tub or sprayer of tap water and the decontamination media.
4. Prepare a rinse tub of tap water.
5. Wash equipment with either the bristled brushes or the high pressure wash, until all visible expressions of contamination are removed.
6. Change the wash water frequently, whenever it appears dirty. Use pH or starch iodide papers to monitor the effectiveness of caustic or hypochlorite solutions.
7. Rinse three times with tap water.
8. Rinse three times with deionized water, using a spritzer bottle.
9. As dictated by the Work Plan:
 - a. rinse with 10 % nitric acid, or
 - b. rinse with pesticide grade hexane or methanol
 - c. Air dry the sampling gear if hexane or methanol is used
 - d. Rinse three times with deionized water, using a spritzer bottle
10. Allow sampling tools to air dry, if water contents are important in any solids analysis.
11. If the equipment is to be stored prior to next use, wrap in food grade paper, polyethylene, or aluminum foil.
12. If the Work Plan dictates, generate equipment or rinse blanks at the sampling site, immediately prior to acquisition or the environmental sample.

REFERENCE(S)

USEPA, 1991, Compendium of ERT Soil Sampling and Surface Geophysics Procedures, Interim Final, OSWER Directive 9360.4-02, SOP # 2006

Decontamination for Low Concentration Materials

Environmental Decision Group, Inc. SOP Number - 10
Revision Number - 2
Date - January 13, 1999

THEORY

This SOP describes methods used for preventing, or reducing, cross-contamination during soil/water/waste sampling procedures. Prevention or minimization of cross-contamination is critical for preventing measurement error (bias) into sampling results, and for protecting the health and safety of sampling personnel. These methods are effective for decontamination of sampling gear and supplies used at work sites impacted with *de minimis* levels of contamination. Although it may be preferable to dedicate sampling gear to the project, *de minimis*, or low, concentrations of contamination are readily amenable to fast, effective, decontamination techniques.

This SOP is appropriate for hand augers, triers, thin walled tube samplers, split spoons, shelby tubes, water bailers, glass tubes, COLIWASAS, and similar sampling devices.

SUMMARY

Contaminants can be physically removed from sampling equipment, or chemically neutralized and/or deactivated. Physical removal can involve abrasive or non-abrasive methods coupled with solubilization/emulsification of the contaminant. The choice of solvent or neutralization agent (i.e. water + detergent, or an organic solvent such as hexane) is made based on the nature of the contaminant. Table 1 provided in this SOP facilitates method selection.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- work plan/sampling plan
- maps
- field logbooks
- data forms
- PPE dictated by site health and safety plan
- camera and film, if necessary
- decontamination media (see suggested media, Table 1 below, select more than one if appropriate)



Table 1

Option Selection	Decontamination reagent or technique	Contaminant of concern
<input type="checkbox"/>	A strong aqueous soap solution using quaternary ammonium sulfate or trisodium phosphate, or equivalent	General
<input type="checkbox"/>	10 % nitric acid in aqueous solution*	Heavy metals
<input type="checkbox"/>	Diesel Hexane; pesticide grade* Methanol; pesticide grade*	Organics
<input type="checkbox"/>	High pressure steam or water wash	General

* These reagents may invoke RCRA waste disposal regulations.

— drop cloths, plastic sheeting, or Visqueen (or equivalent)
— paper towels
— scrub brushes, if necessary
— clean spritzer bottles
— pans or tubs to collect washes and rinsates
— drums for storage of washes and rinsates (see EDG SOP 17)
— swipe sample kits, if necessary
— blank reagent test waters, if necessary
— trash drum
— wash tubs or buckets, if necessary
— potable tap water, either from a water supply spigot or on-site storage tank
— trash bags

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Prepare a wash tub or sprayer of tap water and the decontamination media.
4. Prepare a rinse tub of tap water.
5. Wash equipment with either the bristled brushes or the high pressure wash, until all visible expressions of contamination are removed.
6. Change the wash water frequently, whenever it appears dirty.
7. Rinse three times with tap water.
8. Rinse three times with deionized water, using a spritzer bottle.
9. As dictated by the workplan:



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- a. rinse with 10 % nitric acid, or
 - b. rinse with pesticide grade hexane or methanol
 - c. Air dry the sampling gear if hexane or methanol is used
 - d. Rinse three times with deionized water, using a spritzer bottle
10. Allow sampling tools to air dry, if water contents are important in any solids analysis.
 11. If the equipment is to be stored prior to use, wrap in food grade paper, polyethylene, or aluminum foil.
 12. If the workplan dictates, generate equipment or rinse blanks at the sampling site, immediately prior to acquisition or the environmental sample.

REFERENCE(S)

USEPA, 1991, Compendium of ERT Soil Sampling and Surface Geophysics Procedures, Interim Final,
OSWER Directive 9360.4-02, SOP # 2006

Headspace Soil Screening Using PID

Environmental Decision Group, Inc. SOP Number - 30(A)
Revision Number - 2
Date - October 14, 1999

- ☐ This SOP has been modified to meet site specific conditions. The modifications are detailed as an attachment to this Work Plan.

THEORY

This Standard Operating Procedure (SOP) describes methods for conducting screening of soils either in place or using headspace method. Tools needed for field screening soils include using a hand-operated Photoionization Detector (PID) or Flame Ionization Detector (FID) of choice. This soil field screening method was developed to provide consistency and reliability of results when using PID/FID equipment.

SUMMARY

There are two main techniques for gathering and detecting volatile organic contaminants (VOCs) using a PID or FID. The most common PID field soil screening technique is direct reading from the instrument. The **direct reading** method is used primarily as a general screening technique for ambient detectable volatile organics present at the freshly exposed surface of a soil sample. This technique shows if a contaminant is present or not, but does not give a very reliable or repeatable volatile organic concentration readings based on air and soil temperature, and local air currents.

A more reliable field screening procedure is the **headspace** technique. The two popular and accepted **headspace** techniques used are the jar method or the zip-lock baggie method. Both methods give reliable VOC concentration readings from soil samples when conducted in a consistent manner. Both headspace methods rely on sampling the ambient air from a soil sample which has been sealed or trapped in a zip-lock bag or foil/plastic-covered jar. The readings can vary from sample to sample based on soil type, soil handling, outside or ambient air temperatures and type(s) of volatile contaminants expected.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ field logbook
- ___ Screening device (PID/FID)
- ___ instrument calibration gas and logbook
- ___ correct PID/FID electron/volt eV (10.2 eV) lamp range for volatiles
- ___ headspace sample jars or containers w/ lids or
- ___ resealable plastic zip-lock bags, as necessary
- ___ indelible ink pens
- ___ dedicated or disposable plastic/stainless steel sampling equipment



PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble sampling gear inventory and decontaminate, as warranted.
3. Mark all sampling locations according to the sampling plan.
4. Soil samples collected during drilling actions should be from a split-spoon, or equivalent continuous drilling equipment. Representative soil samples may be collected directly from drill auger flights only if auger is pulled from a known depth and not rotated. Other sample collection methods such as site-specific hand operated sampling tools are also acceptable.
5. Collect soil sample using specified technique.
6. **JAR:** Half-fill 1 clean, 16 ounce glass jar with soil sample and cover mouth of jar with doubled aluminum foil, and screw open-ring cap on jar to secure foil.
BAGGIE: Half-fill 1 new, 16 ounce plastic zip-lock baggie with soil sample and completely close the zip-lock.
7. Agitate the soil sample in the jar or baggie for at minimum of 30 seconds.
8. **JAR:** Allow 10 to 15 minutes for headspace volatiles to develop within a heated vehicle or building. Jars can be placed in a bath of water heated to a specified temperature.
BAGGIE: Allow no more than 1 minute for headspace to develop within a heated vehicle or building. A shorter time is needed for headspace to develop because organic vapors will eventually be adsorbed onto the surface of the plastic baggie, thereby reducing the actual organic vapor concentrations.
9. **JAR:** Quickly insert the PID/FID sampling probe into the aluminum foil and record the maximum PID/FID meter response (should be within the first 3 to 10 seconds).
BAGGIE: Quickly insert the PID/FID sampling probe into the side of the plastic baggie and record the maximum PID/FID meter response (should be within the first 3 to 10 seconds).
Continued screening of sample may give erratic meter responses due to relative high organic vapor concentrations and elevated headspace moisture.
10. Record headspace reading (Jar or Baggie).
11. Use only new Baggies or new/cleaned jars for subsequent screened samples.
12. PID/FID instruments must be calibrated, checked and/or adjusted daily and recorded in equipment log book.
13. Any deviation from these procedures must be noted and a basis stated for deviation.



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REFERENCE

South Dakota Department of Environment and Natural Resources, Groundwater Quality Program, Handbook for investigation and Corrective Action Requirements For Discharges From Storage Tanks, Piping Systems and Other Spills, July 1994.

14.ASTM D 1586 - 84, Standard Method for Penetration Test and Split Barrel Sampling of Soils

ASTM D 1587 - 83, Standard Practice for Thin - Walled Tube Sampling of Soils

ASTM D 1452 - 80, Standard Practice for Soil Investigation and Sampling by Auger Borings

Monitor Well Construction

Environmental Decision Group, Inc. SOP Number - 6A
Revision Number - 3
Date - January 13, 1999

THEORY

The primary objective of a monitoring well is to provide an access point for measuring groundwater levels and to permit procurement of groundwater samples that accurately represent in-situ groundwater conditions at the specific point of sampling. The construction materials and their proper installation have a direct impact on the quality of samples and water levels represented by the monitoring well. It is necessary to have a thorough knowledge of the diverse types of materials and techniques used in monitoring well construction.

SUMMARY

Monitoring well construction should be undertaken with minimum disturbance to native soils. The construction materials should be compatible with the anticipated geological and chemical environment. The length and placement of the well screen should allow for fluctuating water levels within the formation. The monitoring well should be completed within the desired zone and sealed to allow for the collection of representative water quality samples.

PROCEDURES

- Clear utilities with proper agencies
- Assemble gear
- Identify proposed well location
- Review H&S plan and workplan
- Well boring: Each boring will be advanced by 8-inch diameter OD, 4.25-inch ID hollow stem auger. No drilling fluids will be used. Auger flights and downhole pipe will be connected without petroleum-based joint compound. Soil samples for laboratory analysis and field observation will be collected by split spoon. If cobbles or concrete cause auger refusal at depth, the drilling will convert to an ODEX system that creates a 4.5-inch hole for the remainder of the boring.
- Well installation:

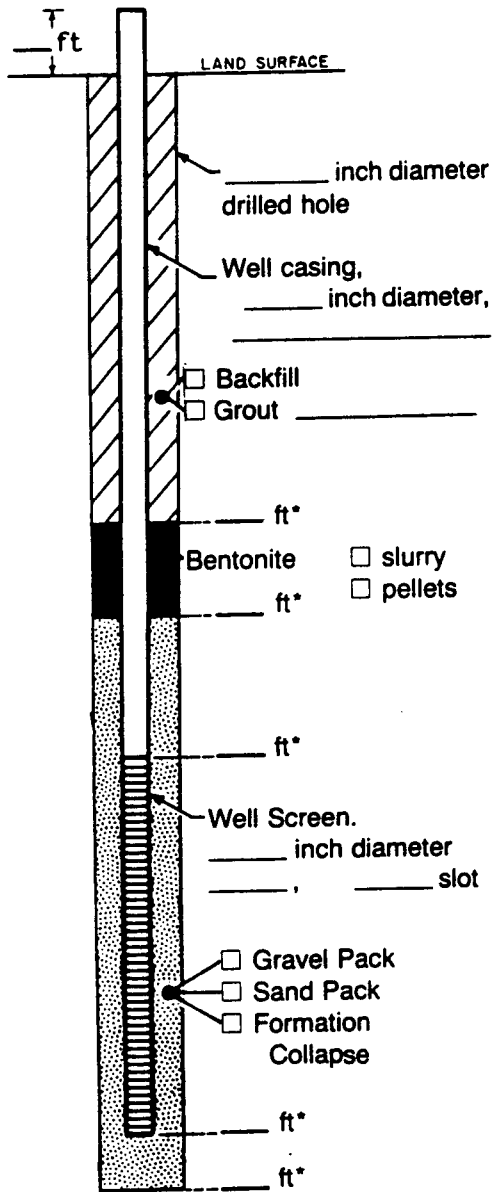
Each well will be constructed with schedule 40, 2-inch, PVC casing pipe and .010 slot screen if DNAPL is not present. Stainless Steel will be used for locations with DNAPL. When the design of the well completion is to sample the top of the unconfined aquifer, a 10-foot screen will be set to extend at least 2 feet of the screen above the current static water table. Deep wells screened below

the static water table will be completed with 5 foot screens. The bottom of each screen will be capped with a 6-inch sump plug. All casing pipe and screen will be assembled using threaded connections without binder or cement. If the wells are completed within the hollow stem augers, no centralizers will be used.

Annulus Packing - After a well casing and screen is set. The annulus will be filled for 2 feet above the screen with 10/20 or equivalent quartz sand filter pack. The filling will be poured between the auger and the casing and screen, and the auger will be slowly raised to allow the entire boring to fill with settling sand. About 2-inches of fine sand will be added to the top of the filter pack. The amount of filter pack may have to be modified when the water table is within 1 to 3 feet of the ground surface in order to permit an adequate bentonite seal. A 2-foot thick seal of hydrated bentonite chips will be set over the packing. The remaining fill to the frost zone (about 1 foot deep) will consist of neat cement.

Wellhead: Each well casing completed above ground will have a protective casing cemented in place. If a water resistant drive-over vault (ground-flush mount) is necessary, it will be cemented in place around the top of the well casing. A 4' diameter by 4" thick circular concrete pad will be constructed around the well installation. The top of the well casing will be set with concrete for at least a foot below the surface. The casing will be secured with a J-plug locking water seal cap. The protective pipe will have a locked cap and well identification. The drainage and venting characteristics of the wellhead completion will be as indicated on the diagram.

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project _____ Well _____

Town/City _____

County _____ State _____

Permit No. _____

Land-Surface Elevation

and Datum _____ feet

☐ surveyed

☐ estimated

Installation Dates(s) _____

Drilling Method _____

Drilling Contractor _____

Drilling Fluid _____

Development Techniques(s) and Date(s) _____

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm

Date _____

Specific Capacity _____ gpm/ft

Well Purpose _____

Remarks _____

Prepared by _____



Monitoring Well Development

Environmental Decision Group, Inc. SOP Number - 6 (B)

Revision Number - 1

Date - April 17, 1998

- ☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

Groundwater samples must be as representative as possible of aquifer groundwater conditions. Installation of groundwater monitoring wells disturbs the wells' host formation. The purpose of monitoring well development is to restore, as much as is practical, nearby formation conditions to the original condition.

Well development ensures removal of fines from the vicinity of the well screen and restores the natural hydraulic conductivity of the formation. This allows free flow of water from the formation into the well and also reduces the turbidity of the water during sampling events. Turbidity reduction is critical, because sampling of improperly developed turbid wells can bias analytical results.

SUMMARY

In general, the well should be developed shortly after it is drilled to remove fines produced during drilling. A variety of techniques are available for development: bailing, surge block, over-pumping, and jetting with water or air. Each technique creates reversals and surges in groundwater flow to remove bridging by particles.

Formation waters should be used for developing the well. In low-yielding formations, an outside source of water may sometimes be introduced into the well to facilitate development. It is essential that at least five times the amount of water added to the well be produced back from the well in order to ensure that all added water is removed from the formation.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ field logbooks
- ___ PPE dictated by site health and safety plan
- ___ water level meter
- ___ pH meter
- ___ thermometer
- ___ conductivity meter
- ___ PPE and monitoring equipment as required by the site health and safety plan



- containers to hold development water (if necessary)
— development apparatus (selected from table below)

Well Development Techniques and Options

Method	Operation	Pluses/Minuses
Bailing	Agitates groundwater, achieves rinsing/cleaning of new well	Easy, no specialized gear needed / may not develop wells in fine grained formations due to inadequate forces
Surge block	Causes surges of formation waters back and forth through sand pack	Effective for difficult to develop wells / requires special tools, decontamination is critical
Water jetting	Effectively removes large quantities of fines from well	Effective for difficult to develop wells / requires special tool, can introduce or dilute formation contamination, can be messy
Air jetting	Effectively removes large quantities of fines from well	Effective for difficult to develop wells / requires special tool, can be messy

PROCEDURES

1. Review health and safety plan.
2. Assemble gear inventory.
3. Decontaminate all gear that is anticipated to be in contact with the well bore water (see EDG SOP 9 or 10).
4. Unlock well, if necessary.
5. Conduct initial or continuous air monitoring if required by health and safety plan.
6. Measure and record Depth to Water (DTW) and Total Depth (TD) if required. (see EDG SOP 7A, 7B, and 7C).
7. Obtain a sample, and measure initial pH, conductivity and temperature see EDG SOP 7A, 7B, and 7C.



8. Note initial color, clarity and odor of the water. **DO NOT** intentionally smell samples.
9. Develop well until water is clear and free from sediment. (NOTE: If the water does not clear sufficiently, it will be necessary to use a decision chart for turbid groundwater samples, such as Figure 3-4 of the EPA RCRA Technical Enforcement Guidance Document, when returning to sample the well.
10. Develop well until a minimum of three consecutive field measurements of temperature, pH, and conductivity have been stabilized within 10 percent.
11. Containerize development waters if appropriate, for later disposal.
12. Note final pH, temperature, conductivity, color, clarity and odor of the water sample.
13. Record method of development and any problems encountered in the field logbook.
14. Remove all sampling refuse from the site.

REFERENCE

Barcelona, M. J. et al., 1985, Practical Guide for Ground - Water Sampling, EPA/600/2-85/104

USEPA, 1987, RCRA Ground-water Monitoring Technical Enforcement Guidance Document; USEPA Office of Waste Programs Enforcement, Office of Solid Waste and Emergency Response, September 1986, 208 pp.

USEPA, Compendium of ERT groundwater sampling procedures, Interim Final; Office of Emergency and Remedial Response, OSWER Directive 9360.4-06, January 1991, SOP #2156.

USEPA and NWWA, 1989, Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA 600/4-89/034.

WATER / PRODUCT MEASUREMENTS

Project No. _____

Site Location _____

Date _____

[illegible]

Field Testing - Oxidation Reduction Potential (ORP)

Environmental Decision Group, Inc. SOP Number - 5 (E)
Revision Number - 1
Date - April 1998

OXIDATION - REDUCTION POTENTIAL

PRINCIPLE

The Oxidation - Reduction Potential (ORP) measurement establishes the ratio of oxidants and reductants prevailing within a solution of water or waste water. The measurement is commonly referred to as the redox potential. The measurement is non-specific in contrast, for example, to the pH measurement. The electrode pair senses the prevailing net potential of a solution. By this measurement, the ability to oxidize or reduce species in the solution may be determined.

This method covers the apparatus and procedure for the electrometric measurement of oxidation-reduction potential in water. It does not deal with the manner in which the solutions are prepared, or the theoretical interpretation of the oxidation-reduction potential for any given system. The method described has been designed for the routine measurement of oxidation-reduction potential which is reported as EMF, Eh or ORP.

INTERFERENCES

1. The ORP electrodes measure nearly all aqueous solutions and in general are not subject to solution interferences from color, turbidity, colloidal matter, and suspended matter.
2. The ORP of an aqueous solution is sensitive to change in temperature of the solution, but temperature correction is rarely done due to its minimal effect and complex reactions. Temperature corrections are usually applied only when it is desired to relate the ORP to the activity of an ion in the solution.
3. The ORP of an aqueous solution is sensitive to pH variations since most oxidation - reduction reactions involve either hydrogen or hydroxyl ions. The ORP varies inversely as the pH; that is, the ORP increases with an increase in hydrogen ion and decreases with an increase in hydroxyl ions.
4. Reproducible oxidation - reduction potentials cannot be obtained for chemical systems that are not reversible. The measurement of end point potential in oxidation - reduction titration is sometimes of this type.
5. If the metallic portion of the ORP electrode is spongelike, materials may be absorbed from solutions which are not washed away, even by repeated rinsing. In such cases, the electrode may exhibit a memory effect, particularly if it is desired to detect a relatively low concentration of a particular species immediately after a measurement has been made in a relatively concentrated solution. A brightly polished metal electrode surface is required for accurate measurements.



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6. The ORP resulting from interactions among several chemical systems present in mixed solutions may not be assignable to any single chemical.

APPARATUS

1. Meter - Most laboratory pH meters can be used for measurements of ORP by substitution of an appropriate set of electrodes and meter scale. The choice will depend on the accuracy desired in the determination.
2. Reference Electrode - A calomel, silver-silver chloride, or other reference electrode of constant potential can be used. If a saturated calomel electrode is used, some potassium chloride crystals must be contained in the saturated potassium chloride solution. If the reference electrode is of the flowing junction type, the design of the electrode must permit a fresh liquid junction to be formed between the solution of potassium chloride and the standard or the test solution. The electrode design must also allow traces of solution to be washed from the outer surfaces of the electrodes. To ensure the desired slow outward flow of the reference-electrode solution, the solution pressure inside the liquid junction should be somewhat in excess of that outside the junction. In nonpressurized applications this requirement can be met by maintaining the inside solution level higher than the outside solution level. If the reference electrode is the nonflowing junction type, these outward flow and pressurization considerations do not apply.
3. Oxidation - Reduction Electrode - A noble metal is used in the construction of oxidation-reduction electrodes. The most common metals employed are: platinum, gold and silver. It is important to select a metal that is not attacked by the test solution. The construction of the electrode shall be such that only the noble metal comes in contact with the test solution. The area of the noble metal in contact with the test solution should be approximately 1 sq. cm. Often the reference and ORP electrode are combined into a single probe unit.
4. Electrode Assembly - Conventional electrode holder or support can be employed for laboratory measurements. There are many different styles of electrode holders for various process applications such as measurements in an open tank, process pipe line, pressure vessel, or a high pressure sample line.

REAGENTS

Reagent grade chemicals should be used in all tests. Unless otherwise indicated, all reagents should conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available. Other grades may be used, provided it is first ascertained the reagent is of sufficiently high purity to permit use without lessening the accuracy of the determination.

1. Chromic Acid Cleaning Solution - Dissolve about 5g. of potassium dichromate ($K_2Cr_2O_7$) in 500 ml. of concentrated sulfuric acid (H_2SO_4).
2. Detergent. Use any commercially available "low-suds" liquid or solid detergent.



3. Nitric-Acid Solution (1 + 1). - Mix equal volumes of concentrated nitric acid (HNO_3) and water.

4. Standard Redox Solutions.

A. Ferrous-Ferric Solution. Dissolve 39.21g. of ferrous ammonium sulfate ($\text{Fe}(\text{NH}_4)\text{SO}_4 \cdot 6\text{H}_2\text{O}$), 48.22g. of ferric ammonium sulfate ($\text{FeNH}_4(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$) and 56.2 ml. Sulfuric acid (H_2SO_4) in water and dilute to one liter. The ferrous - ferric solution is reasonably stable solution with a predictable oxidation-reduction potential. The following table represents the potential of the platinum electrode for various reference electrodes at 25°C standard solution.

<u>Reference Electrode</u>	<u>ORP.(mv)</u>
Hg, Hg_2Cl_2 , sat'd KCl	430
Ag, AgCl, 1.00 M. KCl	439
Ag, AgCl, 4.00 M. KCl	475
Ag, AgCl, sat'd KCl	476
Pt, H_2 (p-1), H (a=1)	675

B. Zobell Solution Dissolve 0.99g potassium ferricyanide, 1.27g potassium ferrocyanide and 7.46g potassium chloride in water and dilute to one liter.

<u>Reference Electrode</u>	<u>ORP.(mv)</u>
Ag, AgCl, sat'd KCl	185

C. Quinhydrone Saturated Solution. Prepare a saturated solution of. The solution should have undissolved quinhydrone floating on the quinhydrone surface.

<u>Reference Electrode</u>	<u>ORP.(mv)</u>
Ag, AgCl, sat'd KCL	(223)

5. Aqua Regia. - Mix 1 part of concentrated nitric acid (HNO_3) with 4 parts of concentrated hydrochloric acid (HCl). It is recommended that only enough solution be prepared for your immediate requirements and the solution not used be discarded.

PROCEDURE

After the assembly has been checked for sensitivity or standardized, wash the electrodes with three changes of water or by means of a flowing stream from a wash bottle. Place the sample in a clean glass beaker or sample cup and insert the electrode(s). Provide adequate agitation throughout the



measurement period. Read the millivolt potential of the solution allowing sufficient time for the system to stabilize. Measure successive portions of the sample until readings on two successive portions differ by no more than 10 millivolts. A system that is very slow to stabilize probably will not yield a meaningful ORP.

CALCULATION

1. If the meter is calibrated in millivolts, read the oxidation-reduction potential directly from the meter scale. This ORP potential is related to the reference electrode used in the measurement.
2. Calculate the oxidation-reduction potential of the sample, in millivolts, referred to the hydrogen scale as follows:

$$E_h = E_{ref} + E_{obs}$$

Where:

E_h = Oxidation-Reduction Potential in millivolts, referred to the hydrogen scale.

E_{obs} = Observed Oxidation-Reduction Potential, in millivolts of the noble metal-reference electrode employed.

E_{ref} = Observed Oxidation-Reduction Potential, in millivolts, of the reference electrode as related to the hydrogen electrodes.

NOTES

1. Before using electronic type meters, allow adequate warm-up time.
2. Verify the sensitivity of the electrodes by noting the change in millivolt reading when the pH of the test solution is altered. The ORP will increase when the pH of the test solution decreases; likewise, the ORP will decrease if the test solution pH is increased. Place the sample in a clean glass beaker and agitate the sample. Insert the electrodes and note the ORP. Add a small amount of a dilute sodium hydroxide solution and note the value of the ORP. If the ORP drops sharply when the caustic is added, the electrodes are sensitive and operating properly. If the ORP increases sharply when the caustic is added, the polarity is reversed and must be corrected as in manufacturer's instructions. If the ORP does not respond as above when the caustic is added, the electrodes should be cleaned.
3. Checking the response of the electrodes to the standard Redox Solutions -Wash the metal and reference electrode and the sample cup or container with three changes of water or by means of a flowing stream from a wash bottle. Fill the sample container with fresh standard redox solution and immerse the electrodes. Engage the operating button and adjust the control to the EMF of the standard redox solution. Without changing setting, repeat the above procedure until two successive instrument readings are constant. The readings should differ from the millivolt value of the standard redox solution by not more than 10 millivolts. (It usually suffices to check the sensitivity



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of the electrodes since the important feature is the change of potential as related to the concentration of the oxidant or reductant present. The actual numerical value of the potential will vary depending on the constituents present in the water. By using both Zobell solution and ferrous-ferric solution, the effectiveness of the electrodes can be determined at two widespread ORP values.

4. **Electrode Treatment** - ORP electrodes should be conditioned and maintained as recommended by the manufacturer. If the assembly is in intermittent use, the immersible ends of the electrodes should be kept in water between measurements. The junctions and fill-holes of reference electrodes should be covered to reduce evaporation during prolonged storage.
5. **ORP Electrode Cleaning** - Remove traces of foreign matter. Immerse the Oxidation-Reduction electrode in warm aqua regia (70C) and allow to stand for a period of about 1 minute. This solution dissolves the noble metal as well as any foreign matter so that the electrode should not be allowed to stand in it longer than the time specified. The above treatment in aqua regia may also be used cautiously to recondition an electrode that has become unreliable. It also is possible to clean the electrode in HNO₃ (1 + 1). Heat the solution and electrode gradually to boiling. Maintain just below the boiling point for about 5 min. and allow the solution and electrode to cool. Wash the electrode in water several times. It is desirable to clean the electrode at room temperature in chromic acid cleaning mixture and then rinse first with dilute hydrochloric acid followed by water. Preliminary cleaning with a detergent is effective in removing oily residues. A mild abrasive can be used to remove some particular matter. In these cleaning operations particular care must be exercised to protect the glass-metal seals from sudden changes of temperature.
6. **Temperature Effects on ORP Measurements**

The effects of temperature on ORP measurements can be understood by considering the Nerst equation.

$$E = E^0 - 2.3 \frac{RT}{nF} \log Q$$

Where E^0 = the measured potential

E = the potential when all components involved in the reaction are at unit activity and 25°C.

R = Gas constant

T = The absolute temperature, t°C + 273.15

F = Faraday

n = number of electrons involved in the reaction



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Q = Product of the activities of the oxidants divided by the product of the activities of the reductants, each activity raised to that power whose exponent is the coefficient of the substance in the applicable chemical reaction.

Changes in E° with temperature produce the same changes in E . Further the slope of the curve which relates E and T depends directly on T . Finally, changes in activity with temperature will produce changes in E .

Automatic temperature compensation is seldom attempted in ORP measurements, due to the appearance of n in the prelogarithmic factor of the Nerst equation. The slope of the plot of E vs. T thus depends not only on T , but on n as well, so that different amounts of compensation are required, depending on the value on n . If the process under study is well characterized and the value on n known, automatic temperature compensation is possible. However, if the value of n is unknown or variable then compensation is not possible.



Field Testing - Turbidity Meter Measurements

Environmental Decision Group, Inc. SOP Number - 5 (F)

Revision Number - 2

Date - January 13, 1999

THEORY

Turbidity meter measurements are conducted during purging of monitoring wells to establish when steady state conditions are attained.

SUMMARY

This Standard Operating Procedure (SOP) describes the field method for obtaining the measurement referred to as Turbidity. This method covers the operation and calibration of specifically the, H F Scientific, Model DRT—16CE portable Turbidity meter. This SOP covers the generic apparatus and procedure for the spectrophotometric measurement of suspended particulates in water. It is important that the field instrument be calibrated prior to conducting turbidity readings of water samples.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

- ___ H F Scientific, Model DRT—16CE portable Turbidity meter
- ___ PPE dictated in site health and safety plan
- ___ logbook or field data sheets
- ___ solvent free pens and markers
- ___ sample containers
- ___ distilled or deionized water

PROCEDURES

The standard operating procedures to be followed when calibrating the HF Scientific Model DRT-15CE portable Turbidity meter are described below.

1. Decontaminate the meter according to the procedures described in the attached manual in the meter case.
2. Turn on meter.
3. Place standard in holder and cover with cap. Make sure the outside of the vial which holds the standard is clean and has been wiped dry.
4. Record the pre-calibration reading of Turbidity on the Equipment Calibration Log, or in a field notebook.
5. Adjust the Turbidity reading using the reference adjusting knob so it is equivalent to the value of the standard (typically 0.02 NTU). Record the calibration value on the Equipment Calibration Log, or in a field notebook. Expiration dates of the standard solution, as appropriate, should be recorded on the instrument log.
6. Turn off meter.

The standard operating procedures used when taking readings using the HF Scientific Model DRT-15CE portable Turbidity meter are described below.

1. Decontaminate the meter according to the procedures described in the attached manual in the meter case.



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2. Make sure the inside of the sample vial is clean and dry.
3. Fill the sample vial with water sample to be measured.
4. Turn on meter.
5. Place water sample vial in holder and cover with cap. Make sure the outside of the vial which holds the standard is clean and has been wiped dry.
6. Use the scale knob to identify the required turbidity range of the sample.
7. Read the Turbidity of the water sample and record on the Water Purging And Sampling Log, or in a field notebook.
8. Turn off meter.
9. Rinse sample vial with distilled water between readings.

REFERENCE

HF Scientific Model DRT-15CE portable Turbidity meter manual.